THE BRITISH ISLES

S. J. B. WHYBROW


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THE BRITISH ISLES

A School Certificate Geography

BY

S. J. B. WHYBROW, B.Sc., F.R.G.S.

Senior Geography Master at the Central Foundation Boys' School, London

ILLUSTRATED WITH
66 MAPS AND 16 PAGES OF
PHOTOGRAPHS

J. M. DENT AND SONS LTD.
BEDFORD ST. LONDON W.C.

MADE IN GREAT BRITAIN AT
THE TEMPLE PRESS, LETCHWORTH, HERTS
FIRST PUBLISHED 1944

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PREFACE

I am told there are people who do not care for maps, and I find it hard to believe.—R. L. STEVENSON.

THIS book, which is meant for the fourth and fifth forms, is designed to cover the requirements of the School Certificate examinations of the British universities. It has two distinguishing features, a liberal use of:

(i) Sketch-maps, which are to be gradually built up by the pupils themselves.

(ii) Questions, planned to make the pupil think, interspersed throughout the text.

As, at a casual glance, the book might appear to be an exercise book, it should be made clear that it is a text-book, and contains all necessary information. The author firmly believes in the value of sketch-maps as the shorthand of geography, but feels that it is better, where possible, that students should be encouraged to make their own maps rather than that everything should be done for them. Thus in this book simplified sketch-maps of each region showing coast-line, upland, main rivers, and towns are given; these are easy to copy, and help in drawing the maps has been added where this seemed of value. Students are expected to complete these maps from the information given in the book, and thus make for themselves a summary of each region. For the convenience of the teacher in checking the accuracy of the work of students on their sketch-maps, place names have been shown with initial letters, except where two or more towns or rivers begin with the same letter. In the first area to be discussed, the Central Lowlands of Scotland, the sketch-map has been completed as an example. It is pointed out, however, in the chapter, that this map would be a great deal better if

done under ordinary school conditions, with a bigger page and the opportunity to use both ink and pencil, and perhaps a coloured pencil as well.

The second idea is the use of questions in the body of the chapter. There is no need to tell students everything and never allow them to think; why must we continually write such sentences as 'Norwich, in the centre of a farming district, has industries connected with farming, e.g. agricultural implements, starch, mustard, beer'? It is surely better to give the industries and ask the student to draw the connection. Questions of geographical fact are not asked, unless the information has been given earlier in the book. The author feels that with the guidance which has been given the students will find no difficulty in answering the questions; he can only say that all have been used with success in his own teaching of Great Britain and Ireland. The questions may, obviously, either be answered orally in the course of a lesson or written as 'prep.'

Photographs have been included where it is felt that illustration would enrich the general idea of a region.

The examining bodies of the universities of Oxford, Cambridge, London, Bristol, and those of the Northern Universities Joint Board and the Central Welsh Board, have kindly given permission for the use of School Certificate questions set by them. These have been added at the end of the appropriate chapter. The following abbreviations have been used: Northern Universities Joint Board, N.U.J.B.; and the Central Welsh Board, C.W.B.

I desire to thank Miss S. W. Pearson, B.Sc., Mr. H. L. Constable, B.A., and Mr. H. W. Marsh, of J. M. Dent & Sons Ltd., for reading the book in manuscript, and for their many valuable criticisms and suggestions. In the past teachers and students have written to the author about his books: he can only repeat that criticisms will be welcomed.

S. J. B. W.

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CHAPTER I

POSITION, PHYSICAL FEATURES, THE CONTINENTAL SHELF, TIDES, FISHING

THE British Isles, two large and over five hundred smaller islands off north-west Europe, lie in a 10° net, that is, most of the land is between 50° N. and 60° N. latitude, and between 0° and 10° W. longitude. The total area is but 120,000 square miles, only 3 per cent of the total expanse of Europe. This insignificance in size is often not realized: Ireland or Scotland has about the same area as Lake Superior in North America, and Eire is the same size as Tasmania or Ceylon. It will be shown later, on page 8, that historical factors have altered the significance of the position of the British Isles.

This book is a description of present-day conditions, but, to understand these, it is necessary not only to consider events in recent times, but also some which happened millions of years ago, the geological history of the British Isles.

The English Channel and the North Sea are shallow; if, for example, St. Paul's Cathedral were placed on the sea floor it would not be completely submerged, and there are some large areas, called banks, where the sea is as little as 100 ft. deep. The best known of these is the Dogger Bank (*dogge* is Dutch for cod). Diagram 1 shows this shallow water, and a section shows that the real edge of the Continent of Europe lies some 50–100 miles to the west of Ireland. The British Isles are said to lie on a continental shelf; they have been separated from the Continent by subsidence of the intervening land. It is thus to be expected that the main surface features of Great Britain and Ireland will correspond with those on the Continent. Diagram 1 shows what the drainage of the British Isles may have been before

this subsidence took place : a much extended Rhine gathering up left-bank tributaries from eastern Great Britain, an enlarged Seine draining southern England, and a river flowing south between Ireland and Wales.

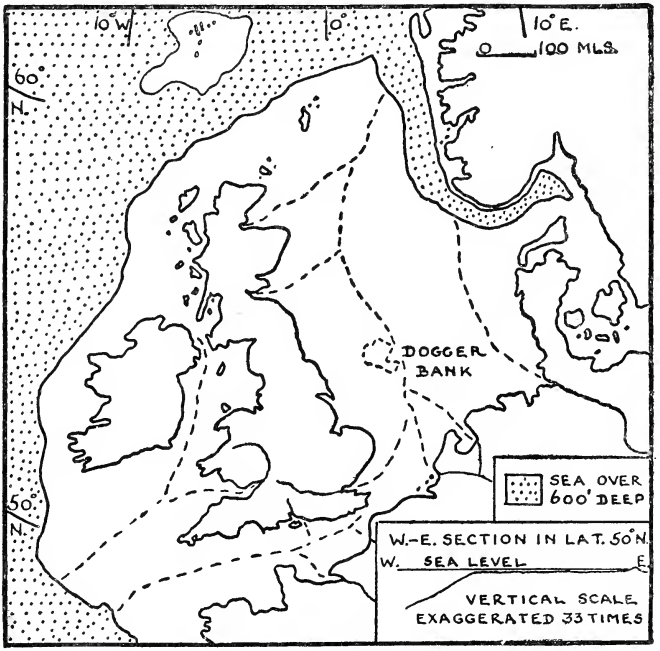


Diagram 1. The Continental Shelf

In other parts of the world severe earthquakes sometimes cause heavy loss of life and considerable damage. These earth movements to-day are mild and insignificant compared with activities in the past, before man appeared on the earth, when gigantic quakes buckled and folded the surface rocks, and slowly formed great mountain systems. The world to-day is enjoying a period of comparative quiet. There was a number of such periods of mountain building, and three of these have affected large areas in Great Britain

and Ireland. The oldest of them is called the Caledonian because it was during this time that the Scottish Highlands and the Southern Uplands of Scotland were formed. Diagram 2, however, shows that the mountains of this

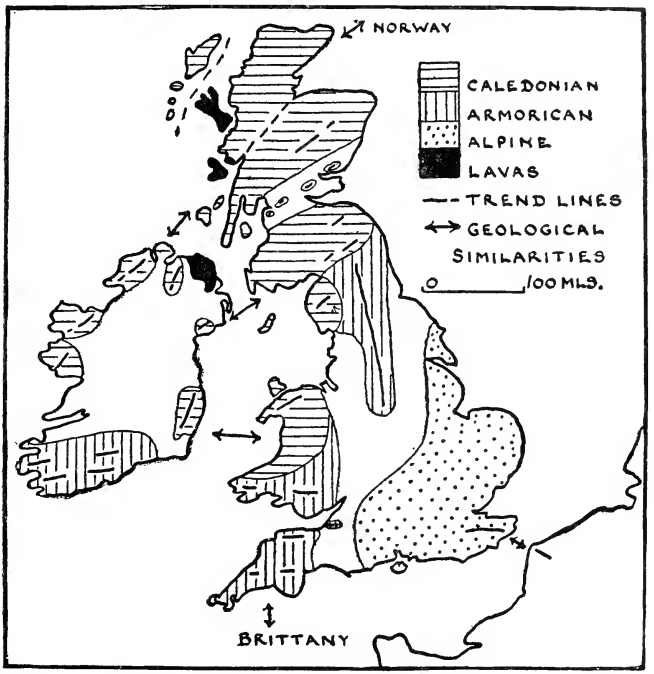


DIAGRAM 2. A SIMPLIFIED MAP SHOWING THE MAIN AREAS AFFECTED DURING THE CALEDONIAN, ARMORICAN, AND ALPINE PERIODS OF MOUNTAIN BUILDING

period are found not only in Scotland but in the Lake District, Wales, and north-western Ireland, and that the ranges lie usually in a N.E.–S.W. direction. It is thus sometimes said that the 'grain' of the Scottish Highlands is N.E.–S.W. Later came the Armorican period, so called from an old Celtic name for Brittany in north-western France, and it will be seen that the direction of the ranges in this case is usually from west to east, as in southern

Ireland, South Wales, Dartmoor, Exmoor, and the Mendips. In the Pennines, however, which were probably formed at this time, the direction of the fold is from north to south. It will be noticed that, in Great Britain, these areas of mountain building are in the north and west. Some part of these upland areas always seems to have been dry land despite many changes in the level of the land compared with the sea. The south and east, however, have been many times submerged, and this part was covered with sediments, sands, clays, chalk, and limestone. Tennyson, whose poetry often embodied the scientific ideas which were being born during the nineteenth century, expressed it:

> There where the long street roars, hath been
> The stillness of the central sea.

But these rocks of the south-east are similar to those in France and Belgium: perhaps the most striking example of this may be seen by an observer on the chalk cliffs of Dover who, on a clear day, can see the chalk cliffs of Calais across the narrow stretch of water which has saved Britain from invasion for nearly a thousand years. These rocks were affected during another period of mountain building, called the Alpine, because it was during this time that the Alps and many other of the great folded mountains of the world were formed. The north and west, farther from the centre of mountain building, were almost untouched except that lavas welled up through cracks then formed. The plateau of Antrim in north-eastern Ireland is of lava, the Giant's Causeway is made of six-sided columns of basalt, and there is a similar formation in Staffa, an island in the Hebrides. Skye and Mull also contain volcanic material.

But not only have the British Isles suffered changes of this kind; there have been, in addition, many changes of climate. In Carboniferous times, about 250,000,000 years ago, so called by geologists because in some of the layers then deposited coal is found, the climate was hot and wet.

Much of the land was swampy, and it was the vegetation of the swamps which was later crushed by sea sediments to form coal. Later in geological history the climate was hot and dry, and Britain was a desert. The land, as so often in deserts, was red in colour, and the reddish soils of parts of the Midlands are a legacy of this age. Much more recently, probably about one million years ago, the climate became bitterly cold, and ice, forming first on the higher land of the north and west, gradually spread down the mountain sides and covered the lower land. All Ireland and Great Britain as far south as a line joining the Thames and the Bristol Channel were affected, the east of Great Britain mainly by an ice sheet centred in the highlands of Scandinavia. There were intervals, probably three, when the climate became warmer and the ice melted, but it was not until some ten to fifteen thousand years ago that this glacial period ended. The effects of the ice age will be discussed later in the chapter.

DIAGRAM 3. THE HIGHLAND AND LOWLAND ZONES OF GREAT BRITAIN

Diagram 3 shows the broad division that may be made of Great Britain. North and west of the 'Exe-Tees' line are the old hard rocks, the highland zone, while south and east of this line are the newer softer rocks. There are lowlands in the highland zone, but the broad distinction remains true. The south-east is not a flat, monotonous

lowland, for the harder chalk and limestone have not been worn away as easily as the softer clays, and thus the chalk and limestone form lines of low hills or of plateau country. The existence of this highland zone not only affects the way of life of people to-day, but has had a profound effect on the history of Britain.

As the ice sheet gradually retreated from Great Britain the country was occupied by people of Middle and Late Old Stone Age culture from the Continent; they came probably before the separation of this island from the mainland.

Later two main streams of settlers with superior cultures came from the Continent. The earlier, coming along the coasts of Spain and western France, reached Ireland, western England, and western Scotland. It is called megalithic (Greek *megas*=great, *lithos*=stone) from the great stone circles and avenues they built, of which Avebury and Stonehenge are the best known. Their chiefs were buried in stone huts over which earth was heaped to form huge mounds or 'barrows.' The other, known as Beaker Folk, from the shape of the earthenware pots they used, came, much later, from central Europe, across the North Sea. It may be wondered why they did not come the shortest way, but it is probable that the tides of the newly formed Straits of Dover were too violent for these early navigators. These two peoples spread over England.

The earliest inhabitants of Britain were food-gatherers, but these later arrivals brought improved tools and a knowledge of agriculture. Thus developed the later Old Stone Age and Bronze Age cultures in which the communities ceased to be self-sufficient, agriculture and the crafts developed, and long-distance overseas trade began. When bronze implements were first used in England is uncertain, but it was somewhere between 2000 and 1500 B.C. Settlement in England was principally on the chalk and limestone hills of the south and east. Early man objected to

the dense forest and water-holding soil of the lowlands and, moreover, these were the home of the wolf, boar, bear, and wild ox. The soil of the open and more lightly wooded hills could be worked by primitive implements, and here, too, early man avoided the ague and rheumatism of the damp lowlands.

Question 1. Stonehenge and Avebury, shown on diagram 4, were important tribal gathering places. What can be noticed about their position?

DIAGRAM 4. THE CHALK AND LIMESTONE AREAS OF SOUTH-EASTERN ENGLAND

Some time about 1000–800 B.C. the Belgae, an iron-using people, introduced their heavy, ox-drawn, iron-coultered plough, and some clearing of the lowlands began. It is known that Caesar was attracted by the wheat-lands of southern England. The Romans extended this lowland cultivation, but it was the Angles, Jutes, and Saxons of the sixth and seventh centuries A.D., men used to working heavy land, who, with their heavy plough drawn by eight oxen, made the first considerable inroad into the forest and marsh. The Romans, who were an upper class of administrators and traders, had lived side by side with the earlier inhabitants, who became 'Romanized' especially to the south and east of a line from the Wash to Plymouth. The Saxons, on the other hand, who came to conquer and decided to stay, either drove the Celts before them or isolated them in enclaves. In fact, one may compare the action of the

Saxons to the Celts with that of the English to the Red Indians in North America.

Question 2. (i) The Romans occupied the whole of what is now England; they did not conquer Wales, although they had some military posts to protect miners, and in Scotland only in the south was their control felt, and that only for a short time. Ireland remained outside the Roman Empire. What can be said about the extent of the Roman conquest of Britain?

DIAGRAM 5. THE BRITISH ISLES IN THE MIDDLE OF THE EIGHTH CENTURY (according to Bede)

(ii) Diagram 5 shows the extent of the occupation of Britain by Angles, Saxons, and Jutes in the middle of the eighth century. What can be said about this conquest?

It was mentioned in the first paragraph that although since historical times the British Isles have been two large and a number of smaller islands, historical factors have altered the significance of this statement. Two thousand years ago, when the Mediterranean Sea justified its name, and was in the middle of the important lands, the British Isles were on the fringe of the then known world. To the Romans, Britain was an outpost of empire, and the mountainous areas of Wales and Scotland were their north-west frontier inhabited by turbulent tribes, as the north-west frontier of India is to-day. The great change in the world

position of the British Isles came with the discovery of America; Britain was no longer on the edge of the known lands, but in the middle, on the routes between the 'old' and 'new' worlds. The Mediterranean Sea became, as a result of this discovery, together with that of the Portuguese route to India via the Cape of Good Hope, a backwater until the opening of the Suez Canal in 1869.

The effects of glaciation are important. On the higher land of Scotland and elsewhere, the slowly moving ice removed the surface layers and, to-day, large areas are almost without soil and thus are useless for farming. It must be realized that the formation of soil, which means the gradual alteration of the surface layers of any rock, under the action of the weather, is a slow process and, if the rocks are hard, a very slow one. In lower areas, e.g. in most of the plain of east England, as far south as the Thames and in the west Pennine plain, the soil removed from the higher land was deposited. Were it not for these glacial drifts the author would not now be sitting in a house in Norfolk writing this book, for the district would be under the sea. In East Anglia much of the land covered by these drifts is called boulder clay, from the stones found in it. This clay, which has been mixed with the chalk of the neighbourhood, produces a fertile soil. Again, a geological map, which indicates the 'solid' geology or main rock structure, shows the plain of Ireland as carboniferous limestone, but, in fact, much of the plain is covered to a great depth by glacial deposits. A striking feature in glaciated areas is the U-shaped valley caused by the smoothing of the sides by ice and the truncating of spurs, and this may be contrasted with the V-shaped valley of areas unaffected by ice action.

The continental shelf is important for its effects on tides and on fishing. The main cause of the tides is the attraction of the moon on the oceans, and the tidal waves so caused move because the earth is rotating. The sun also affects the tides, and thus at full moon and new moon, when the

attraction of the sun aids that of the moon, high tides are higher and low tides are lower. These fortnightly high tides are called spring tides, and at half-moon, when the sun and moon are working in opposition, is the period of neap tides. The tides of north-west Europe may be thought of as a wave coming in from the Atlantic. In the open ocean high tide is but two or three feet, but when the wave reaches the coast the effect of the continental shelf is to increase high tide to twenty feet, or even more, above low tide. High tides occur at intervals of about 12 hours 25 minutes.

Question 3. Height of spring tide in feet: Scilly Isles, 16; Lundy Island, 27; Cardiff, 37; Avonmouth, 40; Sharpness (12 miles south-west of Gloucester on the east of the Bristol Channel), 42. Draw a simple sketch-map inserting these facts. What can be noticed? Bearing in mind the shape of the Bristol Channel what conclusion can be drawn?

The extra depth of water at high tide means that ships can come farther up the estuaries than they otherwise could. In the many tiny ports round the coast small ships, usually coastal vessels, come in at high tide, moor up at the wharves, and may be resting on the bottom at low tide. In the bigger ports the docks are often enclosed basins; for example, on the Thames, where the difference between high tide and low tide is some twenty feet, big ships come up river at high tide, enter the docks, and the dock gates are then shut.

Question 4. The movement of water in and out of an estuary is valuable in another way. Explain. Remember (*a*) that all rivers carry mud, and (*b*) what happens when dirty water in a wash-basin is not swilled about when the stopper is pulled out.

Question 3 shows the great increase of high tide in a narrowing estuary, and this sometimes results in a low wall of water moving up a river at high tide. In the Severn this is called the bore and, in the Trent, the eagre; the level of the water may be raised five or six feet in a few minutes.

The continental shelf is also important because fish are only found in large numbers where the water is comparatively shallow. Round the British Isles most of the fishing is done in waters which are less than 100 fathoms deep (see diagram 1), although some fishing does take place in water up to 250 fathoms deep. Although fish are cannibalistic in that they feed on fish smaller than themselves, ultimately the number of fish in a sea depends on the supply of minute plants and sea animals which are drifted by ocean currents, and hence are called plankton, from a Greek word meaning wandering. Fish may be divided into two main classes, those which normally live near the surface, such as herring and mackerel, which move in shoals, and those living near the sea-floor like sole, plaice, cod, or hake. But even surface fish, herring and others, spawn on the sea-bed, so that obviously the depth of the sea is important to both classes of fish. The movement of water caused by both tides and the 'westerlies' renews the supply of plankton, and may be compared with the changing of the water in a bowl of goldfish.

Question 5. The two other great fishing grounds of the world are the seas off (i) Newfoundland, (ii) Japan. What similarities can be noticed between these and the seas off north-west Europe in (*a*) depth, (*b*) latitude, (*c*) general position?

Most fish are caught in one of three ways—by trawl, by drift-net, or by line. Some two-thirds of the million tons of fish brought annually to British ports are caught by trawler. A trawl is a bag-shaped net, which is dragged

along at or near to the sea-bed by a slow-moving trawler. This method is thus used for fish which live near the sea-floor.

Question 6. The floor of the North Sea is relatively free from rocks, for it is covered with sands and mud. What advantage is this to a trawler?

Nearly all trawlers to-day are driven by steam, and they fish not only in home waters, for some of the bigger ones may go as far north as Iceland or as far south as the coasts of Portugal and north-west Africa. On these occasions it is necessary to take many tons of fuel and ice, and the trawlers return home with perhaps fifty tons of fish.

Fish living near the surface are caught by drift-net. The net is about 100 ft. long by 40 ft. deep. The top of the net is about 10 ft. below the surface, and is kept there by lines attached to the net with corks at the top. The net is kept vertical by small weights at the bottom of the net. Nets are used in large numbers, perhaps eighty or ninety, attached to one another, and the ship is allowed to drift with wind and tide, hence the name drifter. The gills of the fish, e.g. herring, mackerel, become entangled in the mesh of the net.

Question 7. (i) The size of the mesh of drift-nets varies, e.g. it is 1 in. for herring. Why is this?

(ii) What would be found in a trawl when hoisted? What would be found in a drift-net?

[Remember that surface fish travel in shoals.]

Fishing by line is unimportant compared with the trawl or the drift-net. It is used to catch the larger fish, cod, haddock, halibut, although these are also caught by trawl. The lines may be miles long and may contain thousands of baited hooks.

It remains to mention some minor aspects of the fishing industry. Oysters are bred in the shallow mud-flats on either side of the Thames estuary, off Whitstable (Kent) and at the mouth of the Colne (Essex). Crabs and lobsters

The Times

THE SCOTTISH HERRING FISHERY FLEET AT YARMOUTH. PD on the leading ship stands for Peterhead. At what time of the year was the photograph taken?

are caught in 'pots,' large baskets with a hole at the top. It is easy for a crab or lobster to get into the pot to eat the bait, but very difficult to get out again. The pots are sunk to the bottom of the sea with a buoy to mark their position.

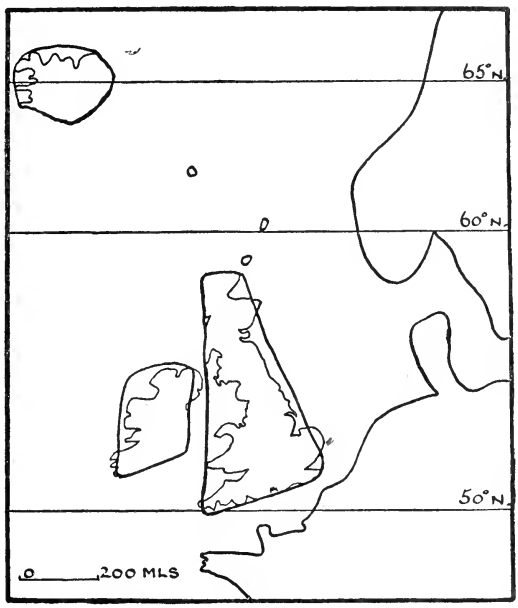


Diagram 6. Sketch-map for Question 8
(Fishing grounds)

Lobsters are caught off the rocky shores of south-west England, and also in the Orkneys and Hebrides. Crabs are caught mainly off north-east England.

Question 8. Copy diagram 6 on a larger scale and show the following. [As the idea of the map is to show the main fishing grounds the outlines of Great Britain, Ireland, and Iceland may be copied in the simplified form suggested.] *Herring* off Orkneys and Shetlands in June, off the east Scottish coast and the north-east

English coast in August and September, and off Yarmouth, Lowestoft, and the Thames estuary in October and November; *cod* Iceland and the North Sea; *haddock* north of North Sea; *halibut* Iceland; *hake* south Ireland; *skate and sole* western England. There is no need to state the time of the year with the fish living near the sea-floor as they are caught throughout the year.

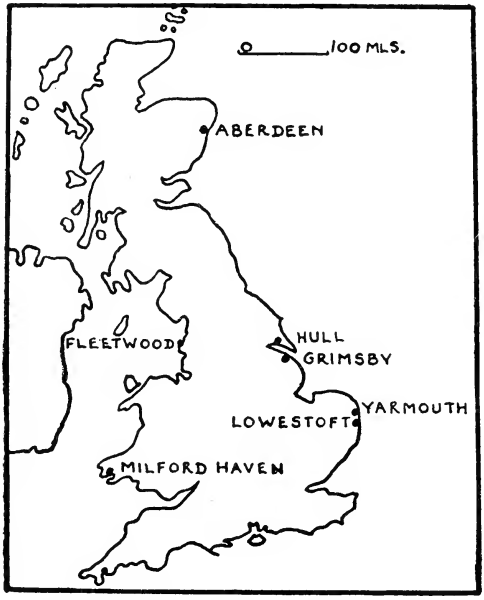


Diagram 7. The Important Fishing Ports

It was thought at one time that shoals of herring moved southwards in the North Sea from June onward. This has been proved incorrect, for the fish which appear off Yarmouth and Lowestoft in October and November are not of the same type as those seen off the Shetlands earlier in the year.

Fresh fish is perishable, and only those ports with good railway connections to the densely peopled areas are important; diagram 7 shows the main ones. The ports are

usually as near the fishing grounds as possible, and are not far up estuaries as are so many cargo ports. Of these fishing ports Hull and Grimsby are pre-eminent for cod, Yarmouth and Lowestoft for herring, whereas Fleetwood and Milford are important for hake. The fish landed is not, however, only for home consumption, for salted herring are exported to the countries round the Baltic Sea, and salted cod to countries in south Europe. Because the chief fishing grounds for herring vary throughout the season the drifters use ports in the north in June and July and then, later on, ports farther south. Scots fisher girls, who gut the fish before it is packed with salt in barrels ready for export, follow the drifters southwards, working at ports in the north in early summer and at Yarmouth and Lowestoft in October and November. There are also other 'camp-followers' of the industry, salesmen, coopers, and curers.

Question 9. There is a considerable demand for fish in the countries of southern Europe. What are the reasons? [Bear in mind (*a*) the depth of the Mediterranean Sea, (*b*) the religion of the majority of the people of southern Europe.]

CHAPTER II

CLIMATE AND WEATHER

THE quip of foreigners that the Englishman's only topic of conversation is the weather is an indication of its day-to-day variability. Although the month of January may have days with arctic conditions and a snow-covered landscape, followed by days like those of spring; or July may have a heat-wave that merits the word tropical, it is still true that the main feature of the British climate is its equability. Britain is not a country of disastrous floods, long periods of drought, or seasons of great heat or cold. Climate has been termed average weather, and thus these daily changes, often so disconcerting to the foreigner, are hidden when dealing with mean figures.

The main points to be discussed are temperature in winter and summer, and rainfall, both the season and the amount. The mean temperature figure of a day is taken as the average of the maximum and minimum of that day, while the mean of a month is the average of the daily means. When it is said that the mean January temperature of London is 39° F., this figure has been obtained by taking the average over a long period, usually at least thirty years, of all the January means of London. Mean figures are useful in that they show the main similarity or difference between two places, but they have the disadvantage that they mask not only the daily changes but also the range between day and night. Even in an area as small as that of the British Isles the range in the east is greater than in the west. Great Britain and Ireland have the usual equable temperatures, that is, the small range between winter and summer, associated with island climates. Water warms up more slowly than land, but also cools more slowly, and so

islands do not have the extremes of temperature which occur in the interior of great land masses in temperate latitudes.

Question 1. Mean January temperatures in ° F. [See also diagram 8 of January temperatures.]

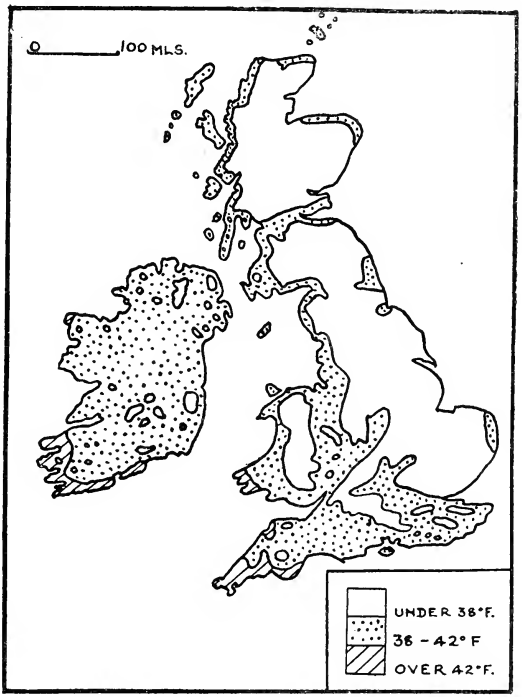


Diagram 8. Mean January Temperatures

(*a*) Valentia (south-west Ireland), 44; Cardigan (Wales), 42; Worcester, 39; Bedford, 38.

(*b*) Bedford, 38; Sheffield, 38; Stirling, 38.

(*c*) Exeter, 42; Cardigan, 42, Holyhead, 42; south of Lewis (an island in the Hebrides), 42.

What conclusion can be drawn? [Note that the

towns in (*a*) are on a west-to-east line, whereas those of (*b*) and (*c*) are on a north-to-south line.]

The British Isles are not only islands; they are islands on the west side of a continent, which makes their position more fortunate still. The prevalent wind in these latitudes is from the south-west, and this blows warm water, the

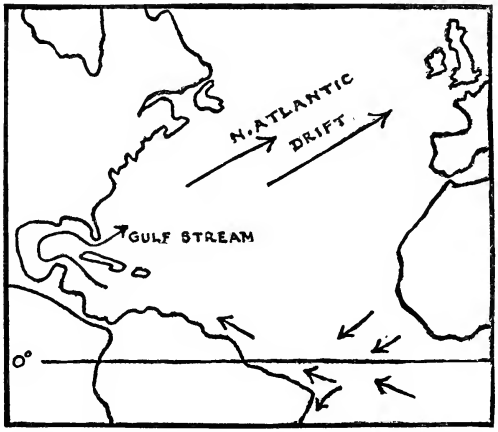


Diagram 9. The Gulf Stream and the North Atlantic Drift

North Atlantic Drift, which keeps the wind warm (diagram 9). In winter when the sun is low in the sky, its strength weak, and its time above the horizon short, it is this warmed south-west wind which is the main factor in deciding temperatures. 'Apt alliteration's artful aid' makes this easy to remember: the *w*est is the *w*armer in *w*inter. The answers to Question 1 will have shown that latitude is not a deciding factor; London is as cold as Edinburgh, but north-west Scotland is warmer than London. The warmest parts in winter are the extreme south-west of Ireland and the south-west of England. These mean differences between west and east are only a few degrees, but they are perceptible and of importance in farming. In the lowlands of

Cornwall, for example, frosts are not common, snow is rare, and palm-trees will flourish out of doors. The author met a girl of eighteen in Falmouth (Cornwall) who had never seen snow!

The west is warmer than the east, but Britain as a whole

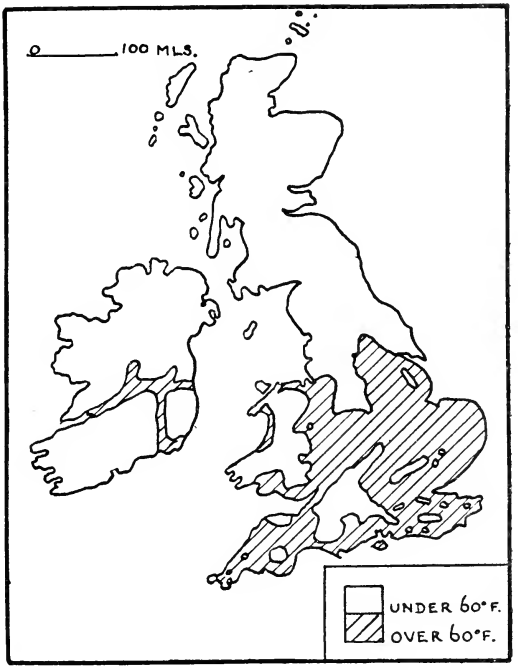


Diagram 10. Mean July Temperatures

is warmer in winter than anywhere else in the world in the same latitudes, and some regions in the north are as much as 30° F. higher than the average for the latitude. Its island position explains why Britain is warmer than central Russia, and its situation on the west of a continent why it is warmer than eastern Siberia or the St. Lawrence region. It would seem, however, that north-western North America ought to be as warm as north-western Europe, but it is not,

e.g. Sitka (Alaska), latitude 57° N., January mean temperature 30° F.; Fort William (Scotland), latitude 57° N., January mean temperature 39° F. (Both these places are at sea level.) The probable cause is illustrated in diagram 9, namely that Cape St. Roque in Brazil diverts to the Gulf Stream, and hence to the North Atlantic Drift, some of the warm water of the south Atlantic.

Question 2. Mean July temperature in ° F. [See also diagram 10 of July temperatures.]

(*a*) Southampton, 62; Derby, 61; Durham, 60; Edinburgh, 59; Aberdeen, 58; Wick, 56.

(*b*) In Ireland: Waterford, 60; Londonderry, 58.

What can be noticed about the positions of the towns in groups (*a*) and (*b*)? What conclusion can be drawn?

In summer when the sun is higher in the sky and thus stronger, and its time above the horizon long, it is the sun which is the deciding factor, and temperatures decrease from south to north.

In diagrams 8 and 10 actual temperatures are shown, but in diagram 11 sea-level isotherms have been drawn. To make such a map the temperature of every town above sea level is increased to what it would be if the town were at sea level. Differences of temperature due solely to variations in height are thus eliminated, and a more general picture of temperature conditions indicated.

Question 3. Explain the curve of the 60° F. July isotherm over Ireland and Great Britain (diagram 11).

Question 4.

Mean January temps., ° F.	39	44	38	42
Mean July temps., ° F.	54	59	62	59

The figures of Valentia, Cambridge, Holyhead, and Orkney are given in a different order above. Which is which? [Winter temperatures will decide whether a

place is in the west or east, summer temperatures whether it is in the north or south.]

Question 5.

Mean January temps., ° F.	39	12	44	26	31
Mean July temps., ° F.	63	72	59	66	65

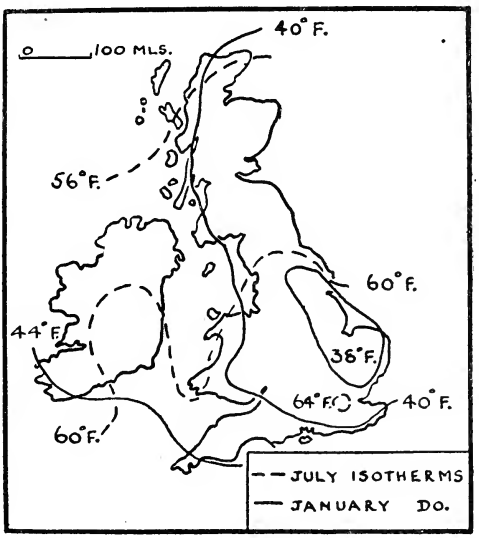


DIAGRAM 11. JANUARY AND JULY ISOTHERMS
(reduced to sea level)

The temperatures of Valentia, London, Berlin, Warsaw, and Saratov (south Russia), all approximately in the same latitude, are given in a different order above. Which is which? What can be noticed about the *difference* in the winter temperatures compared with the difference in the summer temperatures?

It has been mentioned above that the British Isles lie in the track of the 'westerlies' throughout the year, and it is true that winds come from a westerly quarter on about one-half the days of the year. This is a great simplification of

the truth, and it is necessary to examine two pressure formations, cyclones and anticyclones, which influence British climate.

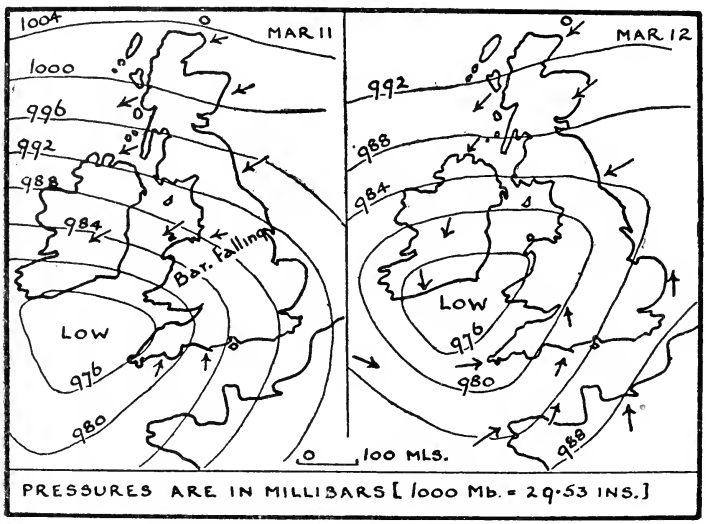


Diagram 12. Maps of a Cyclone

Question 6. Diagram 12 shows the low-pressure system to which the name cyclone is given.

(i) Which way are the winds in the cyclone moving?
(ii) Which way has the cyclone, as a whole, moved?

Cyclones usually move in an easterly direction, that is, they may be thought of as part of the general west-wind stream, and may be likened to whirls or eddies in a river. It is cyclones that bring rain, and diagram 13B, showing the structure of a cyclone, based on the work of two Norwegians named Bjerknes, is an attempt to explain why it rains. In this theory a cyclone is considered as being formed by two main currents of air, the warm air of the south-west winds and cold polar air moving away from the Arctic and forming a north-east wind. Rain occurs where

the warm, light air is forced to rise on meeting colder, heavier air. Diagram 13A shows the areas where rain fell on 12th March, when the cyclone indicated on diagram 12

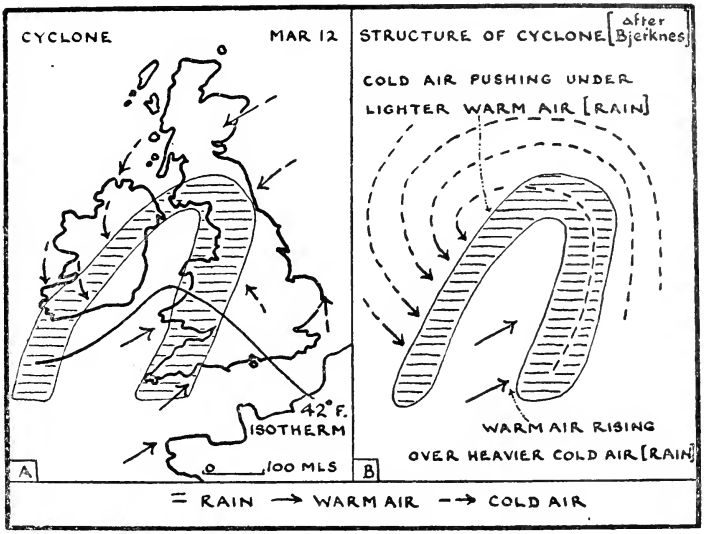


DIAGRAM 13. CONDITIONS IN A CYCLONE AND THE BJERKNES INTERPRETATION

(right) was affecting the British Isles. The isotherm makes it clear that the south-western stream of air was the warmer.

Question 7. If the cyclone shown on diagram 12 (right) and diagram 13 moved approximately a hundred miles in a north-easterly direction by 13th March, state the probable areas where rain fell on that date.

An anticyclone is, as diagram 14 shows, a region of high pressure with air moving slowly outwards in a clockwise direction and, normally, the isobars are much farther apart than in a cyclone. The winds of an anticyclone are thus much weaker than in a cyclone; it is the latter that bring gales and storms. Cyclones are usually moving towards the east, whereas anticyclones may stay in the same area

for days and sometimes weeks together. The air in an anticyclone is usually descending, and thus this pressure formation is not generally associated with rain. (Why?)

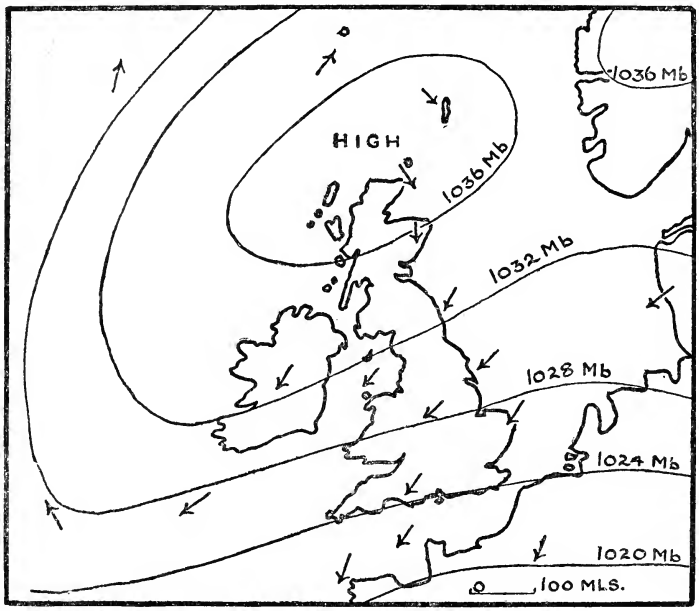


Diagram 14. An Anticyclone
N.B. The isobars of 1032 Mb., 1028 Mb., and 1024 Mb. make continuous lines

In summer anticyclones bring spells of dry sunny weather —heat-waves—but in winter they may give rise either to dry, bright, sunny, frosty weather, or to fog and mist. The latter occur if the land is water-logged after heavy rain; the air near the ground is damp and cools considerably during the night, so that it cannot hold all its water vapour. The minute droplets become visible as mist or fog and the calms and light breezes associated with anticyclones do little to dissipate the mist. It may be added that the reputation of Britain, held abroad, that this is a foggy northern land, is undeserved, for in most places fog only occurs on some

twenty days a year. Shakespeare illustrates this opinion in *Henry V* by making the Constable of France say:

> *Dieu de batailles!* where have they this mettle?
> Is not their climate foggy, raw, and dull?

Question 8. Tabulate the differences between cyclones and anticyclones.

Question 9. Eastern England often gets cold east winds in the winter and early spring. Why is this? [Think of the temperatures of central Europe and what pressure formation is likely to exist.]

Diagram 15. The Mean Annual Rainfall

Britain is in the track of the westerlies, with cyclones throughout the year, and thus, like the rest of north-west

Europe, it has rain at all times of the year. No season is dry in any part of the British Isles but, in the west, winter is usually the wetter half of the year, whereas in the east more rain comes in the summer, often from thunderstorms. It is clear that the west will be wetter than the east, for when a cyclone passes over the mountainous districts of the west the rising air of the cyclone is carried upwards still higher (diagram 15). The differences in rainfall are, in some cases, considerable; for example, Snowdon has over two hundred inches per annum, whereas many parts of eastern England have less than twenty-five inches per annum. No area, however, suffers from the curse of aridity.

Question 10. (i) Why is the plain of Ireland drier than Wales?

(ii) About one-half of the area of England but only one-fifteenth that of Scotland has less than thirty inches of rain per annum. Explain.

Question 11.

	J.	*F.*	*M.*	*A.*	*My.*	*J.*	*Jy.*	*A.*	*S.*	*O.*	*N.*	*D.*	*Total Rain*
Temp. (°F.)	38	40	42	47	53	59	62	61	57	49	44	40	
Rain (in.)	1·8	1·6	1·6	1·6	1·9	2·2	2·4	2·3	1·7	2·9	2·3	2·3	24·8
Temp. (°F.)	39	40	41	45	50	56	59	58	55	49	43	40	
Rain (in.)	1·7	1·6	1·9	1·4	2·0	1·9	2·7	3·1	2·0	2·6	2·1	2·2	25·0
Temp. (°F.)	44	44	45	48	52	57	59	59	57	52	48	46	
Rain (in.)	5·5	5·2	4·5	3·7	3·2	3·2	3·8	4·8	4·1	5·6	5·5	6·6	55·6

The climatic figures of Edinburgh, Valentia, and Oxford are given in a different order above. Which is which? Give reasons for the answer.

This chapter has given a simple account of the main features of British climate, but it should be made clear that many other aspects could be discussed. One example will suffice. It is common to compare the winters of south Cornwall and the French Riviera because the mean January temperatures are about the same. It is true that the south

and south-east of Great Britain have more sunshine than the north but, none the less, Cornwall has far more cloud and far less sun than the Riviera. Again, the daily range in the south of France is greater, so that the daytime temperature, which is the main interest of a traveller, is higher than in Cornwall. Even the type of rain is different, for Riviera rain usually comes in short, sharp showers, whereas the rain of Cornwall often comes on 'soft,' grey, overcast days, with long periods of drizzle.

Examination question. Describe the course of the isotherm of 40° F. in January and that of 60° F. in July over the British Isles. Point out the principal differences between the courses taken by these isotherms and account for the differences. (Oxford.)

CHAPTER III

MINERALS

THE British Isles are rich in coal, and produce some 230 million tons of coal per year, a total exceeded only by the U.S.A., with over 400 million tons per year. Coal represents about 90 per cent of the annual value of the minerals of Great Britain and Ireland.

It has been mentioned in Chapter I that coal has been formed from swamp vegetation of a bygone age. The lowering of the surface buried trees and ferns beneath sand and mud, and other forests grew which in their turn were crushed. This is the reason why, in the coal measures, coal only occurs in layers, varying in thickness from a few inches to many feet, and separated by other rocks. It is impracticable to work layers which are less than about 18 in. thick. In a Burnley (Lancashire) coal-mine, for example, there are 30 ft. of workable coal in twelve seams in a total of 2,000 ft. of coal measures. Beneath the coal measures fire-clay is often found, so called because from it bricks able to withstand fire can be made. The coal measures must have covered much greater areas than they do to-day; probably the whole of south Scotland and the northern half of England formed one great belt, while another stretched from south Wales to south-east England. It has already been said that the folding of the Pennines probably occurred during the Armorican period of mountain building, which was subsequent to the formation of coal. Denudation on the higher Pennines removed the coal layers, and thus coal-fields are now found only on the flanks. Similar earth movements elsewhere are responsible for the present position and extent of the coal-fields. It is possible to divide the coal-fields into three main groups: (*a*) the Scottish fields, (*b*) those lying near the Pennines, (*c*) those in the south (diagram 16).

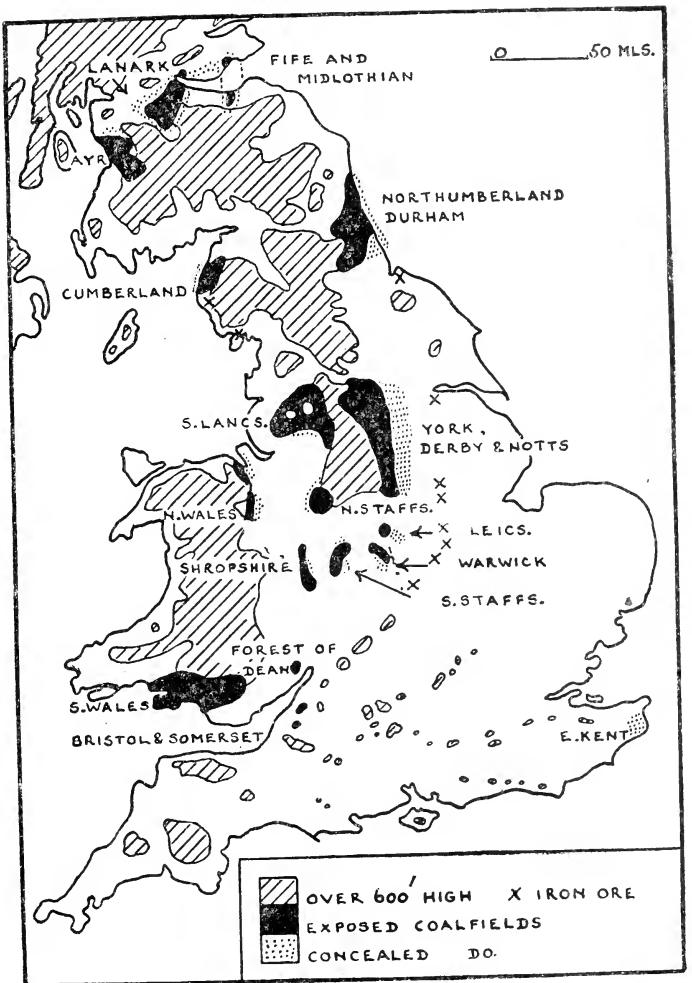


DIAGRAM 16. COAL AND IRON ORE IN GREAT BRITAIN

It is known that coal has been worked for a long time; it was certainly used in Roman Britain, and there are records of 'sea-cole' being brought from Newcastle to London in the twelfth century. These early mines must have been

quarries, and when the surface or outcrop coal was exhausted the seams were followed into the ground as roughly horizontal tunnels or adits. In an adit not only was drainage easy, but the necessity of 'cages' (lifts) for men and coal was avoided. Diagram 17 shows a feature to be found

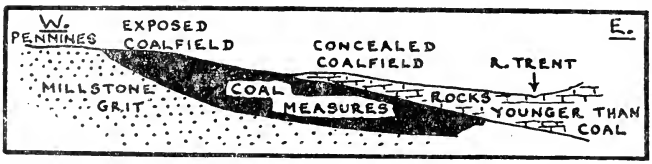


DIAGRAM 17. SECTION ACROSS THE YORKSHIRE COAL-FIELD FROM WEST TO EAST, SHOWING EXPOSED AND CONCEALED PORTIONS OF THE FIELD

in most coal-fields, that a part of the coal measures has been covered with newer rocks. This part is termed the hidden field, and it is only within the last forty years or so that these hidden fields have come into prominence. The East Kent coal-field is entirely hidden and, although its existence was surmised by geologists, it was not until 1890, when borings were being made for a possible Channel tunnel, that coal was definitely discovered.

Question 1. There is one obvious disadvantage to mining in the hidden parts of the coal-fields. What is it?

British coal-fields are at a disadvantage compared with those in some foreign countries. Coal was mined, on a large scale, earlier in Britain than in other areas, and many of the thickest seams are now worked out. For a number of reasons coal-cutting machinery is not used as extensively in Britain as elsewhere; for example, in a number of collieries the roof is 'tender,' so that it is necessary to keep timber supports close to the coal face, and this makes the use of a machine impossible. There is one great disadvantage compared with the U.S.A., the depth of mining. In the U.S.A. this is about 400 ft., but many British mines,

particularly in the hidden parts of the field, go down to over 2,000 ft. Thus the output per man is usually higher in foreign coal-fields than in Britain.

Question 2. Show the following in simple diagram form:

(i) Use of coal in Great Britain in percentages: industry, 56; domestic, 15; railways, 6; export, 23. [Industry is made up of gas and electricity undertakings, 14; iron works, 8; collieries, 5; factories, 29.]

(ii) Production of the main fields in percentages: York, Derby, and Nottingham, 30; Northumberland-Durham, 20; South Wales, 18; Scotland, 12; Lancashire, Cheshire, and north Staffordshire, 9; south Derbyshire and Midlands, 6; other fields, 5.

Each of the main coal-fields will be discussed later in the chapters on the different regions of the British Isles, but it is well to get a broad idea of the position of the big fields and a word on their general significance may be added here. Great Britain is a highly industrialized, densely peopled island, and all its manufacturing areas, except one, that of London, are on or near coal-fields. A short history of one industry will make the reason clear. Until about two hundred years ago industry was carried on in people's homes, and was widespread. Products of a bulky nature, for example, pottery, were made nearly everywhere, and woollen manufacture was found in any district where the two essentials, wool and soft water for washing it, were found together. The cottagers worked for traders, who went with their pack-horses from village to village giving out the raw material and collecting the finished articles. It is known, for example, that even as late as 1770 nearly every Devon cottage had its hand-loom for weaving woollen cloth. Late in the eighteenth century power-driven spinning and weaving machines were invented, and a change came over the industry, the concentration of manufacture

in a few factories instead of in numerous cottages. These factories were situated where there were wool and soft water, and also fast-running streams providing the water-power to drive the new machines. It is interesting to note that a textile factory is still called a mill. Then came the invention of the steam engine, which required coal, and thus woollen industries survived where coal was easily accessible. Many areas, once important, lost their trade, although there are a few towns, away from the coal-fields, which, because of the excellence and specialized nature of their products, have managed to retain their trade. Examples are Witney in Oxfordshire, famous for blankets; Wilton in Wiltshire, for carpets; and Stroud in Gloucestershire, for highly finished cloth used for liveries, hunting outfits, and billiard tables. This change in methods of manufacture is called the Industrial Revolution, an unfortunate term, because it suggests a much more sudden change than actually occurred. Neither is it true to suggest, as is sometimes done, that the new inventions transformed Britain overnight into an industrial country, for, although England did pass through a period when wool was the important export, exemplified by the fact that the Lord Chancellor sits on the Woolsack, by the fifteenth century cloth, not wool, was the main export.

Question 3. (i) What is the origin of the term spinster for an unmarried woman?

(ii) What is meant by the 'distaff' side? (Consult a dictionary if these terms are not known.)

If then the position of the coal-fields is known, the position of the densely peopled industrial areas is known as well, provided always that it is realized that London is the one great exception. Of the forty-two towns in England and Wales of over 100,000 people, thirty-two are on the coal-fields.

The production of iron ore, though important, is less than

The Times

BLAST FURNACES, SOUTH WALES. The furnace on the right has been tapped, and men are dealing with the molten metal

2 per cent of the annual value of all minerals and is, to-day, the only valuable metal. In fact, about one-third of the iron ore used in Great Britain is imported, principally from north Spain, Sweden, and Algeria. Two thousand years ago Cornwall and the Scilly Isles, then called the Cassiterides, from a Greek word meaning tin, were famous for tin, and it is known that lead was exported from Britain by the Romans. The temple of Jerusalem was roofed with British lead. Tin is still mined in Cornwall if the world price is high, but the value of non-ferrous metals is insignificant. Nine-tenths of the iron ore mined in Britain to-day comes from the line of limestone hills which stretches across England from Yorkshire to Dorset. This has not always been the case, for, until the seventies of last century, most of the iron ore was found in the coal measures.

In a blast furnace are placed coke or coal, iron ore, and limestone. The limestone acts as a flux and, combining with the impurities of the iron ore, rises to the top: this is termed slag. One famous rock of the coal measures, 'black-band' ironstone, is a mixture of coal and iron ore; the smelting of it was particularly easy. Limestone is usually available in the coal-fields or iron-ore areas and has never been an influence in deciding the site of iron and steel works. These coal-measure ores are now, however, either exhausted or uneconomical to mine. It was the great wealth of coal, the inventions of power-driven spinning and weaving machines and of the steam engine, and this great advantage of coal and iron ore in close proximity that helped to make Britain, in the nineteenth century, 'the workshop of the world.' Even as late as 1870 Great Britain was producing one-half of the coal and one-half of the pig-iron of the whole world. The iron ore of the limestone hills is low in iron content, but is usually at or near the surface, and is thus quarried. The opening of these mines has not meant the creation of a great industrial population in Lincolnshire or Northamptonshire, for although the ore is smelted locally,

and the sight of blast furnaces and steel mills in the middle of the countryside is a strange one, yet the bulk of the pig-iron is sent to the older iron and steel districts for further treatment. Within recent years much more efficient methods of making iron and steel have been introduced. The coal is made into coke on the spot for the blast furnaces, and the coal-gas and blast-furnace gases are used to generate electricity used in other processes. There are some valuable by-products, tar and ammonia from the making of coke, and slag from the blast furnaces, used as road metal or fertilizer.

But other rocks are mined in addition to coal and iron ore. The harder stones of the uplands have been and are quarried for use in building, for example, the granite of northern Scotland and south-west England or the limestone of the limestone hills. Aberdeen is often called the granite city, and the houses of the Cotswold villages, perhaps the loveliest of all England, are built of limestone blocks and roofed with limestone cut into thin slabs. St. Paul's Cathedral is built of limestone quarried from the Portland district of Dorset. In East Anglia, where hard stone is absent, buildings in the past were often made of flints, and Norfolk, in particular, abounds in flint churches. The chalk and limestone hills provide lime for building purposes, and also one of the ingredients of cement. Cement is made by stirring together powdered chalk or limestone, clay, and water, and heating the mixture. Cement works are to be found where the two essentials occur near together, and usually where water transport is available for the bulky product, e.g. along the lower Thames and the Medway. The name 'Portland' cement was coined because of a supposed resemblance between cement and Portland stone. The slates of north Wales and the Lake District are quarried for roofing. Some varieties of clay are used for brick making, others for the making of pottery, while the decomposition of granite in parts of the moorland of south-

west England has produced kaolin or china clay, used in the manufacture of porcelain. It adds greatly to the interest of a journey if notice is taken of the way in which people have used local material for building. To-day, with the ease of transport, new houses anywhere are commonly built of brick, and offices and public buildings of ferro-concrete.

Question 4. (i) Slates are not used as much as formerly. [Look at the roofs of most new houses.]

(ii) Although flint is a good building material, for, in East Anglia and on the North Downs, flint houses, barns, and walls are often hundreds of years old, it is seldom used to-day. Why have these changes come about? [Think of the work involved.]

CHAPTER IV

FARMING

EVEN in Great Britain, where large coal-fields have become the basis of great manufactures, farming is still a major industry, and in Eire, where manufacture is relatively unimportant, one-half of the working population is employed on farms. There are more farmers in the British Isles than there are in Canada!

An enormous amount of work has been put into the land of the British Isles in historical time. It is known that the Romans found a people who grew wheat and barley, and who reared cattle, sheep, pigs, and goats. Most of this farming was on the chalk and limestone uplands, but, since then, wet lands have been drained, forests cut down, heavy clay soils lightened, and light soils made richer by the addition of clay and marl. Some idea of the work involved may be gathered from the fact that it takes two hundred cartloads of soil to make a layer an inch thick over one acre.

Britain to-day is the most highly mechanized farming country in the world. It is becoming less common to see a horse-drawn plough, harrow, or roller: to-day these are usually drawn by tractor, which has meant a great gain in efficiency, even if a loss in picturesqueness. The loss of manure, too, is regretted, particularly by the older generation of farmers, but the passing of the horse has made farming a more attractive occupation to the farm labourer, for tractors have not to be fed when not in use. One of the latest additions to the farmers' tools is the combine-harvester, a machine worked by two men. Drawn by a tractor, it not only reaps the grain, but threshes it; the corn pours into sacks, and a man, standing on the machine,

Topical Press

A COMBINE HARVESTER. One of the latest types of farm machines. It cuts, threshes the grain, puts the corn into a truck, and discharges the straw in a neat line ready for the pick-up baler

replaces the full sacks by empty ones when necessary. At intervals the tractor stops, and the sacks are put on the ground, and later collected. The straw is left loose on the field, and is gathered by a pick-up baler, which compresses it into bales, and binds these with wire. Some farmers consider that the combine-harvester leaves more grain on the ground than the reaper-binder, and that it tends to scatter the seeds of any weeds. (The photograph shows a slightly different type of machine from the one described; it is less common.)

Diagram 18. The Moorland and Rough Grazing of Great Britain

The cultivation of the soil in Britain takes place on the lowlands, for these islands are too far north for the highlands to be warm enough in summer to ripen crops. Temperature decreases roughly 3° F. per 1,000-ft. rise, and thus, in hotter countries, farming may be carried on to many thousands of feet above sea level. Moreover, in Britain, even the lower hills of 1,000 ft. or so, although warm enough to ripen crops, often have poor soil, heavy rain, and steep slopes, so that agriculture is impracticable. The upland areas are thus given over mainly to sheep-rearing. Sheep can thrive on the grass, the young shoots of the heather, and other wild plants of the hills, and, provided the rain runs away quickly, so that they are dry underfoot, they come to little harm in the cold. Damp ground is liable to give

sheep diseases of the feet, and wet grass may harbour a parasite which, if eaten by sheep, brings on a disease of the liver. The quantity of rainfall is not an important factor provided the ground is well drained. On the best mountain grazing a sheep may require one acre, but, on the poorest,

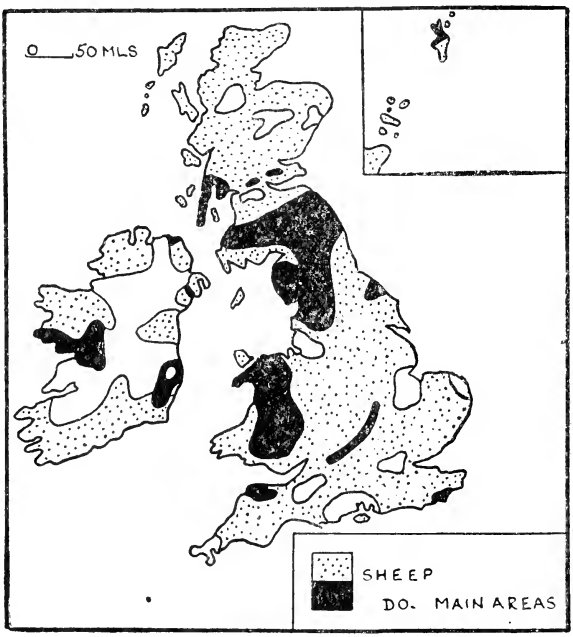


Diagram 19. The Distribution of Sheep

up to ten acres may have to be allowed for each sheep. On the higher land, for example, in the Lake District and Wales, the sheep are brought down from the higher sheep-walks to the lowland farms in the winter.

Question 1. (i) Over one-half of Scotland is classified as rough grazing land, but only one-ninth of England. Why should this be so? [See diagram 18.]

(ii) Examine the map of sheep distribution (diagram 19), and make a list of the important areas.

It should be mentioned here that, although the principal areas for sheep are on the uplands, where little else could be done, they are kept by lowland farmers as well. This point will be dealt with later. Sheep have long been important in the British Isles, and they still are, for their number, about thirty million, is only slightly exceeded by New Zealand, a country which is nearly as big and where mutton and wool are among the chief products.

In many areas in the world the farmer's main concern is to provide himself and his family with food. In parts of France, for example, he will grow wheat, vine, fruit, vegetables, and keep cattle, pigs, and chicken. It is the money gained from the sale of the surplus which enables him to buy those necessaries which he cannot produce himself. This type of husbandry is called subsistence farming, and was to be found in England in the days before communications were easy, and before great quantities of food were imported. The people of any district had to be satisfied mainly with what could be grown in their immediate neighbourhood, and, even as recently as one hundred years ago, Great Britain and Ireland produced, in normal years, enough wheat to feed 90 per cent of the population. To-day a British farmer plans to sell his produce, and whereas, in parts of France, wheat may often be grown in land not ideally suited for it, this does not occur in England, where the farmer chooses the crops which will bring him the greatest financial returns. Only in wartime is this statement untrue, when the Minister of Agriculture may order land to be changed over to grain, potatoes, etc., so that the country may be, as nearly as possible, self-sufficient in the staple foodstuffs. It should be added that subsistence farming is still practised in the Highlands of Scotland and in parts of western Ireland.

Question 2. What are the advantages and disadvantages of subsistence farming? [One main disadvantage

has been mentioned above: to find the important advantage remember that the price of any commodity is affected by conditions thousands of miles away; for example, a bumper crop of wheat in Canada will lower wheat prices everywhere.]

A broad distinction may be drawn between farming in eastern Great Britain and farming in the west. The drier

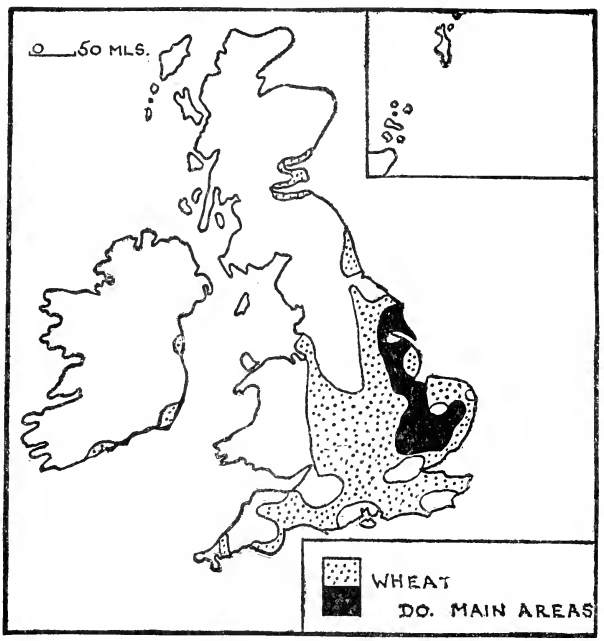


DIAGRAM 20. THE DISTRIBUTION OF WHEAT

east suits grain crops, such as wheat (diagram 20) and barley, but grass grows better in the wetter west. A dry spell in summer in eastern England may show a meadow lying brown and withered in the hot sun in contrast to a thriving wheat field alongside. 'Drought never brought famine in England' was a farmers' saying in the days when Britain depended on its home-grown grain. A farm, then, in eastern

England is usually largely arable, and pasture land is unimportant, whereas in western Great Britain or in the plain of Ireland the farm is mainly meadow land, with but few ploughed fields. The farmer in the east is concerned mainly with his crops, wheat, barley, roots, while the western

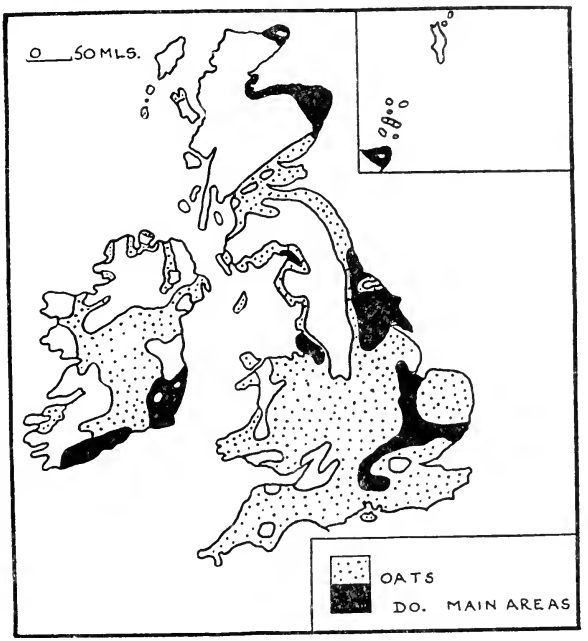


Diagram 21. The Distribution of Oats

farmer is thinking of his cattle thriving on the rich pasture. His few arable fields provide winter feed for his cattle. His only grain crop will be oats, which will stand damper conditions than either wheat or barley, although the oat map (diagram 21) shows that, even with this crop, the best areas are in the drier east. This does not mean that the farmer on the east will have no animals: he usually keeps bullocks and sheep which are out at grass in the summer and are fed in the winter mainly on hay, roots, cattle-cake, and

sugar-beet pulp. Sometimes their food costs the farmer nothing, for in the two or three weeks after the sugar-beet harvest the sheep are turned into the fields to eat the tops. The farmer, too, values his sheep and cattle for their manure. The map of wheat distribution (diagram 20) shows that the crop is not only mainly on the east side of Britain, but that the vale of York is the farthest north of the important districts. Wheat likes a warm, sunny summer and, although it is grown in eastern Scotland, it is not so widely cultivated as in England. Barley will grow on poorer soils and in cooler areas than wheat, and thus is important in eastern Scotland.

Question 3. Dr. Johnson (1709–83) once gave as a definition of oats: 'A food eaten by horses in England and by men in Scotland.' What can be learned from this statement? [Lord Elibank's retort was: 'And where would you see such horses and such men?']

Over much of Great Britain and parts of eastern Ireland there is much mixed farming, the farms are neither predominantly arable nor mainly meadow land. Some of these farmers keep part of their land as permanent pasture and the remainder ploughed, whereas others favour a system in which all fields are ploughed in turn but, when grass is sown, the meadow is allowed to remain pasture for some years.

Question 4. Parts of Essex nearest to London have become important in recent years for dairy cattle, although the area is not climatically suitable. Why has this happened?

It is clear from what has been written that, with the exception of grass, it is the common practice of British farmers to grow a different crop on a field every year. This rotation of crops has a number of advantages. Different crops require different products from the soil and so a

change of crop rests the ground. It *is* possible to grow the same crop year after year, for at Rothamsted Experimental Station wheat has been grown for a century on the same field. Very careful use of fertilizers, however, is necessary, and the crops become much more susceptible to disease. Again, a corn crop allows the weeds to multiply, whereas it is possible to keep a field of roots continuously hoed throughout the summer. The loosening of the soil between the rows is done by horse-hoe, that is, a horse pulls an instrument containing a number of hoes, so that four or more rows are dealt with at once. The initial 'singling' or thinning-out of the crop and the subsequent hoeing in the rows are done by hand-hoe. In the Fens, where crops are heavy, some growers have the important process of singling done by hand: it is often done by women who go up and down the rows on their hands and knees! Hoeing is a continuous farming operation from May until harvest; it not only improves a root-crop—'the more you hoe, the more they 'll grow,' as is said in Norfolk—but leaves the field clean for the following crop.

Question 5. If the main crops of an East Anglian farmer are wheat, barley, grass for hay, and sugar-beet, wheat is planted in autumn, the others in spring. The hay harvest precedes those of wheat and barley, and sugar-beet lifting does not take place until October, November, and December. These facts show another advantage of rotation of crops. Explain.

The crops in a rotation obviously depend on the part of the country, and to-day there is no rigid system. Three examples may be given.

Example I

Potatoes, sown in spring, harvested in September, and the field then prepared for

Wheat, sown in October or November, and harvested in the following August.

Grass, sown in spring when the wheat is only showing a few inches. The harvesting of the wheat does not affect the young grass, and the meadow is used for hay the following year. The next year pigs and chicken are 'folded' over it. This means that the runs of the pigs and chicken are systematically moved across the meadow.

Question 6. Folding not only provides food for the pigs and chicken, but is of benefit to the land. How?

Example II

Barley, sown in spring and grass planted as soon as the barley is showing green.

Grass, for one or two years, cut for hay or used as feed for animals.

Wheat.

Sugar-beet or other root-crop.

Example III

On the chalk and limestone hills of eastern England, where the soil is thin, 'sheep and corn' farming has long been carried on, although changes are now taking place. Under this system two grain crops, usually barley, are grown in a four-year period, and in the other two years fodder crops, vetches, clover, kale, swedes, are grown, on which sheep are folded. Not only are these fodder crops less exhausting than grain, but the poor land is enriched with the manure of the sheep, and even the treading of their small feet, the 'golden hoof,' is of benefit to the light soil. Sheep are an integral part of the farming method.

It has been mentioned above that changes are occurring in downland farming. The reasons for the change are many. Not only has there been a fall in the demand for barley, but also a change in the kind of mutton asked for by

housewives, smaller joints being now preferred in place of the larger ones obtained from the heavy type of down sheep. Folding sheep is an expensive operation, too, for it necessitates the frequent movement of hurdles across a field. Downland farmers have tried to solve their problem in many ways. Some still practise the old method, but have substituted varieties of early maturing sheep in place of the breeds formerly used. In some areas costs have been reduced by laying down land to grass, and fattening sheep mainly on this, instead of the older practice of folding on clover and roots. In other districts, e.g. the Wiltshire Downs and parts of the South Downs, farmers have changed to dairying, but, of course, this is only possible if water is easily obtainable. It might be thought that this would be an expensive change, because of the cost of cow sheds and other farm buildings, but even this difficulty has been overcome by the invention of the 'open-air bail' system. Under this method the cows never leave the pastures: instead of the cows going to the cow shed to be milked, the cow shed, a four- or six-stall movable 'bail,' or shed open on one side, complete with milking machinery, comes to the cows. The bail is brought to a different place in the meadows every day, and thus the meadow is thoroughly manured without the usual expense of carting and spreading.

It is difficult to foretell the future of downland farming, for none can say whether the methods now being tried will prove permanent or not. Many people, however, hold that sheep will never long be absent from the downs.

Another point about rotation of crops must be mentioned which is not quite so easy to understand. If a man and his son have a small vegetable garden behind their house it is not difficult to realize that it is better for them to cultivate all the garden rather than to put twice as much work in digging, hoeing, weeding, etc., on one-half of it. They would certainly get larger crops if they concentrated on the

small piece than if only one of them worked it, but they would not get twice as much. Let the argument now be used for a farmer. If he has the capital and machinery available, is it better for him to farm 1,000 acres or 500? He will certainly get more crops out of the 1,000 acres than he

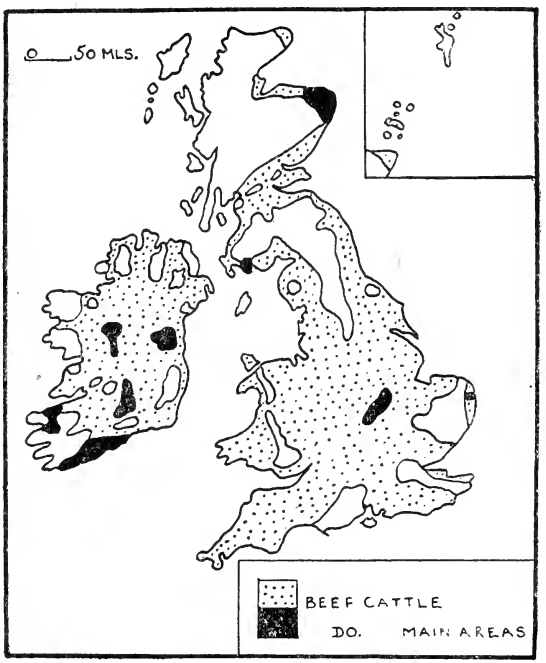


DIAGRAM 22. THE DISTRIBUTION OF BEEF CATTLE

would with the same labour concentrated on 500 acres, but, as against this, he will have to pay the extra rent on 500 acres. In parts of Canada, where rents are low, this will not matter much, and the Canadian farmer will cultivate the 1,000 acres, but in England, where the 500 acres may mean another £500 a year in rent, it will pay the farmer better to concentrate on the smaller area. This is the reason why the yield of wheat per acre in Canada is much less than in

England. It is not that the Canadian farmer does not know his job as well as the Englishman, but that the less intensive method of farming pays him better. The intensive farming of England, which obviously takes far more out of the land, makes rotation of crops still more necessary.

An account of crop farming has occupied most of this chapter, and it is necessary now to consider a farmer with a different outlook, the cattle farmer, mainly to be found in the wet, western plains. Cattle are reared for two purposes in the British Isles, milk and beef, and it is usually found that the farmer concentrates on one of these. If the farm is such that some of the meadow land is scattered, because of stretches of bog or moorland, and so twice-daily milking would be difficult, the farmer is probably interested in 'beef' cattle. The best example in the British Isles of this is in the stretch of plain behind Dublin, where bog makes the meadows in many cases difficult of access. Farms such as these usually sell their bullocks to other farmers to be fattened. Scattered throughout Great Britain there are some pastures where it is possible to fatten cattle on grass alone; a lean bullock turned out in spring will be ready for the butcher by autumn. These 'fattening' pastures are often drained marshland, which is so wet in the winter that the land could never be prepared for summer crops, but, in summer, when drier, the meadows not only provide rich grass but, because the subsoil is moist, remain lush and green even throughout periods of drought. Sun is necessary to make the grass rich enough for fattening, and so the best of these pastures are not in the wettest parts of the country. It is common for the farmers in these districts not to rear their own cattle, but to buy bullocks in the spring. Detail will be added in the various regions later in the book; it is sufficient here to tabulate the main areas: (*a*) in Leicester, Rutland, Northamptonshire, particularly along the valleys of the Welland and the Nen; (*b*) Norfolk, the drained marshland near the Yare

(see diagram 47); (*c*) parts of the Severn valley and its tributaries; (*d*) the drained marshland of northern Somerset; (*e*) north-eastern Scotland (see also diagram 22).

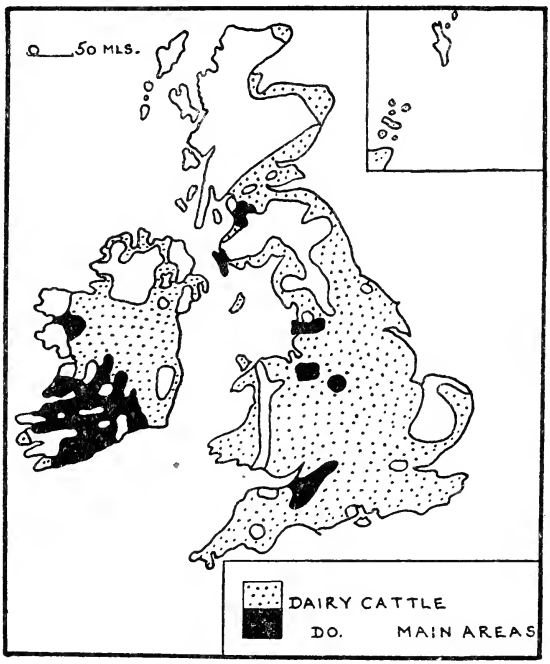


Diagram 23. The Distribution of Dairy Cattle

The dairy farmer (diagram 23) may also fatten some of his bullocks for beef, although his main concern will be for milk. Again, it has already been said that farmers in eastern Great Britain usually keep some bullocks. Many of these farmers buy more in the autumn, often from Ireland, fatten them during the winter, and sell them off in the following spring.

Question 7. If a dairying area has good communications with a nearby industrial district, the milk is sent

there fresh; if, however, there is no market near by or communications are poor, the farmer usually sells the milk locally to factories to be made into butter and cheese. Why is this? (The making of butter and cheese by farmers or their wives has decreased considerably in recent years.)

The broad outlines of British farming have now been described; but one crop, potatoes, used as food for both

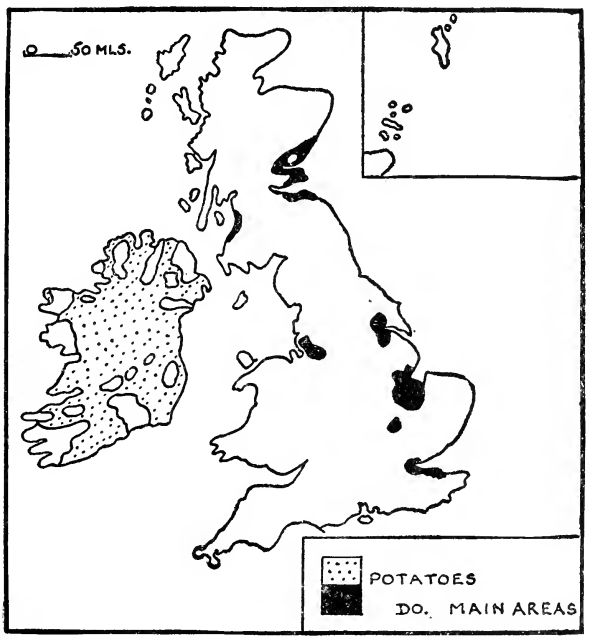


Diagram 24. The Distribution of Potatoes

men and animals, is so widely grown over Great Britain and Ireland that it requires special mention. The wide distribution is easily understood when it is realized that not only will potatoes give a fair crop on poor ground, but that

they will also grow in damp areas. In some of the wet, sunless districts of western Ireland, potatoes are one of the few possible crops, and are a staple food of the people who grow them.

Question 8. It is not worth a farmer's while growing potatoes on a large scale, that is, to sell outside his immediate locality, unless he can get a really good crop. Why is this? [Think of the price.]

Question 9. Diagram 24 shows the main areas. By thinking of the coal areas in diagram 16 which indicate the industrial districts, and thus the regions of dense population, suggest where the potatoes are likely to be sent.

Other animals and crops are of much less importance, being often found in one or two special areas, so that it will be more convenient to discuss them in the regions concerned.

Examination Questions

1. What are the principal British areas in which (*a*) wheat growing, (*b*) dairy farming, (*c*) sheep farming are carried on? Select *one* important area for each of these occupations, and explain how conditions in each area are suited to the particular occupation carried on. (C.W.B.)

2. Name three regions in different parts of the British Isles which have more than sixty inches of rain a year. Explain (*a*) why they receive such heavy rainfall, (*b*) how the rainfall affects the use of the land. (Oxford.)

3. Explain why it is that (*a*) East Anglia has less rain than Wales, and (*b*) there is more arable farming in East Anglia than in Wales. (Oxford.)

4.

	J.	*F.*	*M.*	*A.*	*M.*	*J.*	*J.*	*A.*	*S.*	*O.*	*N.*	*D.*	*Year*
A. Temp. (°F.)	44·4	44·3	45·0	48·0	52·2	56·7	58·8	58·9	56·6	51·5	47·5	45·5	50·8
Rain (in.)	5·5	5·2	4·5	3·7	3·2	3·2	3·8	4·8	4·1	5·6	5·5	6·6	55·6
B. Temp. (°F.)	37·6	39·1	41·8	46·7	52·8	58·5	61·9	61·1	56·9	49·4	43·1	38·9	49·0
Rain (in.)	1·5	1·3	1·5	1·4	1·8	2·1	2·2	2·3	1·6	2·4	1·9	1·9	21·9

Assuming the above statistics to belong to two places near sea level in the British Isles, suggest a location for each and give reasons for your suggestions. State briefly the types of farming you might expect to find in the neighbourhood of these places. (London.)

CHAPTER V

SCOTLAND

THE N.E.–S.W. trend of the 'Caledonian' period of mountain building was mentioned in Chapter I, but the giant mountains which once existed in Scotland are now worn away, and are to-day but rolling upland. Diagram 25 shows a triple division of Scotland: to the north lie the Highlands, a barren plateau region with an average height of from two to three thousand feet; to the south the Southern Uplands, lower and less rugged than the Highlands; while in the centre is the Rift Valley. A rift valley is formed by the sinking of the land between two roughly parallel cracks, but, in this case, the sinking took place so long ago, perhaps 400 million years, that the surface has been much altered by weathering and only in the north is the edge of the rift still clearly seen. Later than this there welled up, from deep down in the earth, volcanic material, some of which forms a line of flat-topped grassy hills, rising to some 1,500–2,000 ft. across the valley.

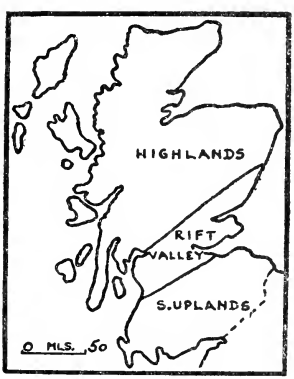


DIAGRAM 25. THE DIVISION OF SCOTLAND INTO THREE REGIONS

In this book simple sketch-maps, to be copied, will be given, showing the main physical features, coal-fields, etc., of every region. The geography of the area will then be discussed, and the main facts must be added to the map which has been copied until it is a map summarizing the chief aspects. Where possible, help has been given in the drawing of outlines and physical features. Thus there is an

inset in diagram 26 entitled 'How to begin.' The fact that the head of the estuary of the Forth is roughly half-way between those of Clyde and Tay is pointed out, and the N.E.–S.W. 'grain' has been mentioned above. The heads

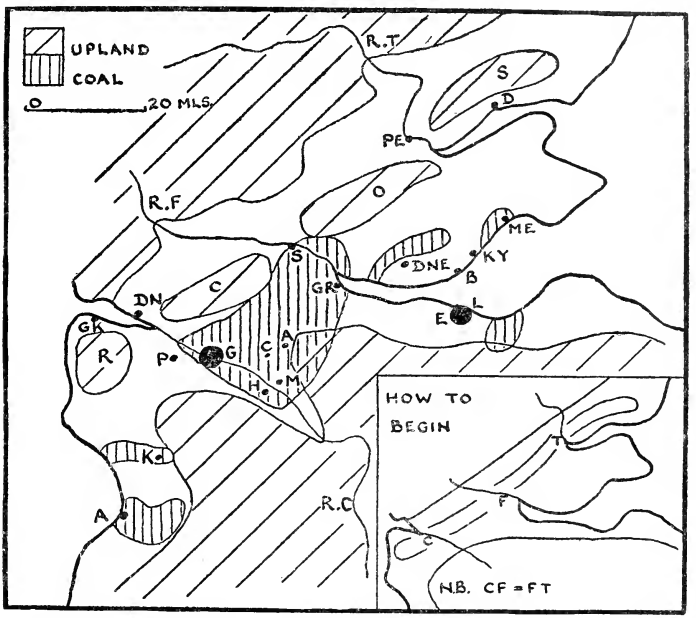


Diagram 26. Sketch-map: the Central Lowlands of Scotland

of the estuaries should be sketched first, then the rivers, the remainder of the coast-line, the Highlands, and the Southern Uplands. It is advisable to sketch the volcanic hills as one continuous area to begin with, as suggested in the inset. The main coal-fields should then be shown, numbered, and a key given to their names and to all shading (see diagram 16 for names of coal-fields).

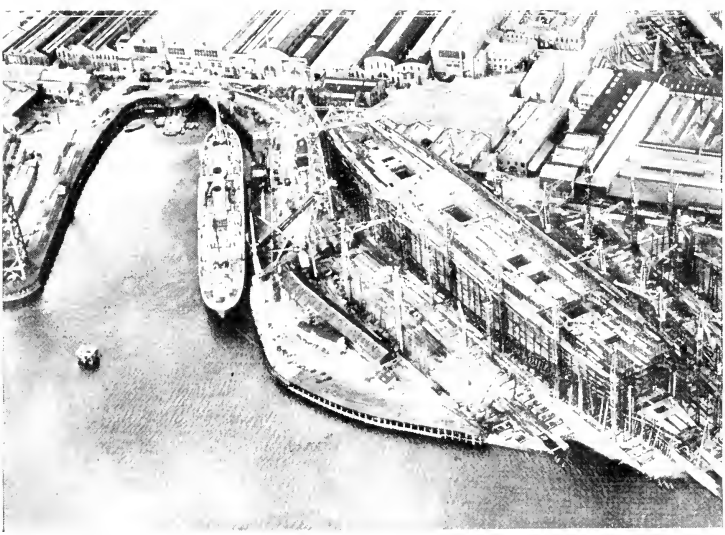
The Lanark Coal-field.

This is the greatest industrial region in Scotland, for it produces about one-half of the country's coal. It has been

said that if a man puts his head into the engine room of any British ship on any of the seven seas and shouts 'Mac!' his call will be answered. This story gives the clue to Scottish industry on the Lanark field: the importance of engineering, and indeed of iron and steel goods generally. In fact, it is difficult to think of iron and steel goods which are not made in Glasgow, Coatbridge, Wishaw, Airdrie, Motherwell, or the smaller towns near by. In Glasgow one-half of the workpeople are metal workers. The Lanark field was one of those rich in 'black-band' ironstone, but to-day iron ore for the blast furnaces is imported mainly from Algeria, Spain, and Sweden. The most important industry of all is shipbuilding, and the yards are to be found on both banks of the lower Clyde: this is the greatest shipbuilding area in the world, the birthplace of such giants as the *Queen Mary* and the *Queen Elizabeth*. When a ship is launched from the slips it is not finished, even the engines have still to be fitted, and thus calm, deep water is essential. Shipbuilding is usually carried on, not only where deep protected water is present, but also where coal and iron are accessible. Building a ship is not just a question of steel plates and rivets; a considerable quantity of finished machinery, boilers, turbines, winches, pumps, and instruments, must be fitted before the ship is ready for sea. Much of this, although valuable, is bulky and difficult to transport and, in the British Isles, shipbuilding areas have usually the associated industries of marine engineering. Although the hull is to-day built of steel, there is still a large amount of wood used in the construction of flooring and cabins, and thus timber and paint industries are often near by. These, as well as others dependent on foreign supplies, soap, flour-milling, are mainly concentrated in towns along the Clyde. Two of the bigger ones, Dumbarton and Greenock, are shown on the sketch-map; both are shipbuilding centres, and Greenock is important for sugar-refining as well. In one town, too, Paisley, cotton is king.

H. J. Smith

THE HIGHLANDS OF SCOTLAND. Loch Affric, Inverness-shire



Sport and General

SHIPBUILDING ON THE CLYDE. A famous yard. Note the ship on the stocks

In the two other coal-fields, those of Ayr, and Fife and Midlothian, export is important. From the Ayr field much is sent to Ireland, particularly Belfast, while about one-half the coal of the eastern field is exported to Scandinavia and the Baltic countries, mainly through the ports of Methil and Burntisland. Although there are cotton mills and engineering works at Kilmarnock, the Ayr field has not given rise to a large number of factory towns. The industries of the east deal principally with flax, used in the manufacture of linen and linoleum, hemp for rope, and jute for sacking. All these raw materials have to be imported, for, although flax has been grown here, its cultivation to-day is negligible. Even as far back as the sixteenth century linen was an important export: it was, of course, a cottage industry and, even to-day, there are many villages with small factories of linen and linoleum in the Fife peninsula, between the estuaries of Tay and Forth. It is not always easy to explain why industries have started in certain towns, for geography deals with the doings of men and women, and the reasons for their actions may not be easy to follow or may not be known. It is not possible in a short book to deal with all cases in detail, but the story of jute in Dundee will illustrate the many factors that may influence the growth of an industry. The manufacture of linen at Dundee, like that of the Fife peninsula mentioned above, was based on local supplies. The town was a port, and therefore the addition of hemp, based on imports from Russia, was not surprising. A third fibre, jute, imported from the Ganges delta, was added about 1830. Hemp was difficult to procure during the Crimean War, and jute became more important. The use of whale oil for softening jute, for Dundee was then a whaling port, and the fact that there were, and still are, many Scotsmen in Calcutta, were probably factors which helped to increase the importance of the industry. The position to-day is that Dundee manufactures jute, hemp, and flax; Dunfermline, damasks; and Kirkcaldy, linoleum,

using hessian from Dundee as a base. The flax is imported principally from the Baltic states and Russia. Dundee also manufactures jam, from locally grown fruit, and marmalade.

Question 1. Why should Dundee manufacture marmalade? [Think (*a*) when British fruit is gathered, (*b*) when Seville oranges are for sale in Britain.]

The extraction of oil from a rock called oil-shale has been an important industry in Midlothian and Linlithgow, just west of Edinburgh, but it has declined with the exhaustion of the richer rocks. To-day a by-product, ammonia, is more important than the oil, and from this and sulphuric acid a valuable fertilizer, sulphate of ammonia, is made.

Edinburgh, originally a fortress town built on an old volcanic plug in the six-mile gap between the Pentland Hills and the coast, became the capital of Scotland. Its industries are engineering, textiles, paper-making, printing, beer, and whisky. The paper-making and printing industries are associated with the fact that the capital became the legal centre of Scotland, and a university town. It is easy to import wood-pulp, the raw material of most papers, from Scandinavia, and the necessary water supply was available. Paper is made not only in Edinburgh, but in many small villages in the nearby Esk valley. Beer and whisky need a good water supply, and barley is grown locally.

The farming of the Lowlands will now be considered, that is, of fertile Strathmore (=the great strath or vale), between the Highlands and the volcanic hills, and of the plains that lie to the south. The broad difference between farming on the east and that on the west, discussed in Chapter IV, is true here: the east is important for crops, and the west for dairying. The crops of the east are wheat, barley, oats, potatoes, and roots. Only in East Lothian are wheat and barley really important, and the fertile Lothians, particularly to the east of Edinburgh, are sometimes known as the 'Garden of Scotland.' Here there is usually a six-year

rotation, grass, oats, potatoes, wheat, turnips, barley. The east is very famous for potatoes, particularly the Lothians and to the east of the Fife peninsula, and Perthshire and Angus have an extensive export of seed potatoes to England, and even to Spain and South Africa.

Question 2. Dairy cows are very important on the west, but on the east they are found in large numbers only near Edinburgh and in the fertile Carse of Gowrie, to the west of Dundee. Explain. [N.B.—Edinburgh and Dundee are the biggest towns of the east.] [Carse is a Scots term for a stretch of alluvial land along the bank of a river.]

Question 3. Cattle reared on the east are mainly for beef. Explain. (Page 41.)

Question 4. (i) The volcanic hills are given over mainly to sheep. Why is this? (Page 37.)

(ii) They also contain many reservoirs supplying water to the densely peopled Lowlands. How are they suitable for this purpose?

Question 5. In south Ayrshire the milk is often used for cheese. Why? (Page 48.)

Question 6. Girvan, to the south of Ayr, is famous for early potatoes, whereas the Fife peninsula produces 'main-crop.' Explain. (Page 18.)

Two points may perhaps be added. Potatoes and oats are grown in the west, but to nothing like the same extent as in the drier east. Fruit and glasshouses, mainly for tomatoes, are found around Lanark; indeed, the apples of Lanark are mentioned as far back as the eighth century.

Towns. Perth and Stirling may be considered together, for they have much in common. They are both situated in gaps in the volcanic hills, and so became market towns in peace and fortresses in war. They were small ports, and the lowest bridging points of their rivers. To-day the firths

are bridged nearer the sea, and the ports of Tay and Forth are Dundee and Leith.

Question 7. The kingdom of Fife retained its independence, owing probably to its isolation, longer than most parts of Scotland. Explain its isolation.

Glasgow, the greatest Scottish port, is largely the creation of men. At the end of the eighteenth century it was possible, at low tide, to paddle across the Clyde, so shallow was the river, but, by making the river narrower to increase the scour, by blasting away hard rocks in the river bed, and by systematic dredging, it has become possible for big ships to reach Glasgow. It has been said that some stretches of the Clyde below Glasgow are as artificial as the Suez Canal.

Question 8. Why is Glasgow more important than Leith or Dundee? [Think of (*a*) the number of entrances on west and east, (*b*) the importance of the Lanark coal-field, (*c*) the countries with which the three ports are likely to trade.]

It should not be difficult from what has been said to indicate the imports and exports of the chief ports. It must be realized that the import of food is always large into all the manufacturing areas of the British Isles. Two points, not obvious, may be mentioned. Leith imports food, mainly butter, eggs, and bacon, from Denmark, Holland, and the Baltic states, which is sold to all the Rift Valley towns. Grangemouth not only imports food, but is also concerned with the import of Swedish iron, timber, and pit-props.

Diagram 27 has been included to suggest how a finished sketch-map should look. The map has defects. It had perforce to be done entirely in ink, with none of the advantages that can be gained by the use of pencil for the uplands, and perhaps a coloured pencil for the coal-fields. The shading for the coal-fields has been done with lines close together in an attempt to make them stand out, but

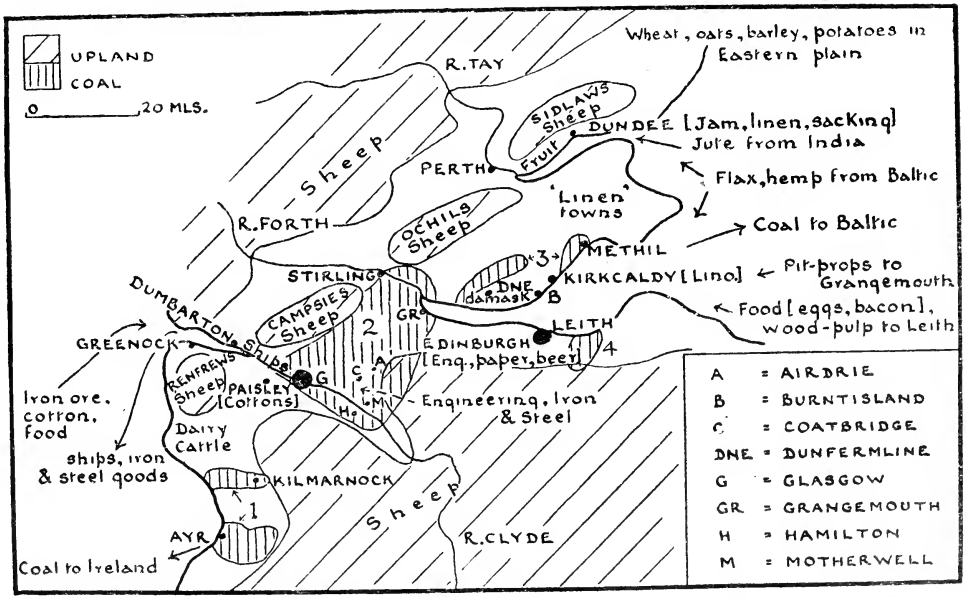


DIAGRAM 27. SKETCH-MAP: THE CENTRAL LOWLANDS OF SCOTLAND

Coal-fields: 1. Ayr; 2. Central or Lanark; 3. Fife; 4. Midlothian

it is not suggested that this should be copied. A wide shading in coloured pencil is much to be preferred. Secondly, it would be a better map if it were bigger, say the size of a page in a mapping book. One word about shading may be added. Well-spaced, free-hand shading in pencil saves much time, and the direction, bottom-left to top-right, used here for the upland, is the easiest for a right-handed person. (Shading in black, used for some of the maps in this book, is ideal with Indian ink, but should not be used for sketch-maps.)

The Highlands.

North of the Central Lowlands lie the Scottish Highlands, divided into two by the trench of Glenmore (=the great glen or valley). Lochs in this trench have been linked where necessary to form the Caledonian Canal. There is a plain only on the east coast.

In drawing the sketch-map (diagram 28) there is no need to copy the exact number of indentations along the west coast; the main point is to show a very indented coast. These bays are fiords, that is, inlets affected by ice action, with steep sides and a bar at the entrance. It is probable that this bar is the moraine of the glacier that flowed down the inlet. Small fishing villages, often connected with one another only by water, as in Norway, nestle in the fiords, and the whole coast reminds the visitor of a lower, less rugged Norway. Technically the whole coast is 'drowned,' that is, the sea has risen so that former valleys have become inlets. Although there are differences between one part of the Highlands and another, for example, the north-west is more rugged than the Grampians to the south of Glenmore—all may be thought of as a plateau, with brown as the prevailing colour, brightened in summer with the vivid green of bracken or in autumn with the rich purple of heather. With poor, thin soil, heavy rainfall, and a cool summer, much is almost uninhabited.

Question 9. (i) Why is the soil thin? (Page 9.)
(ii) Give two reasons why the summers are cool. (Pages 20 and 37.)

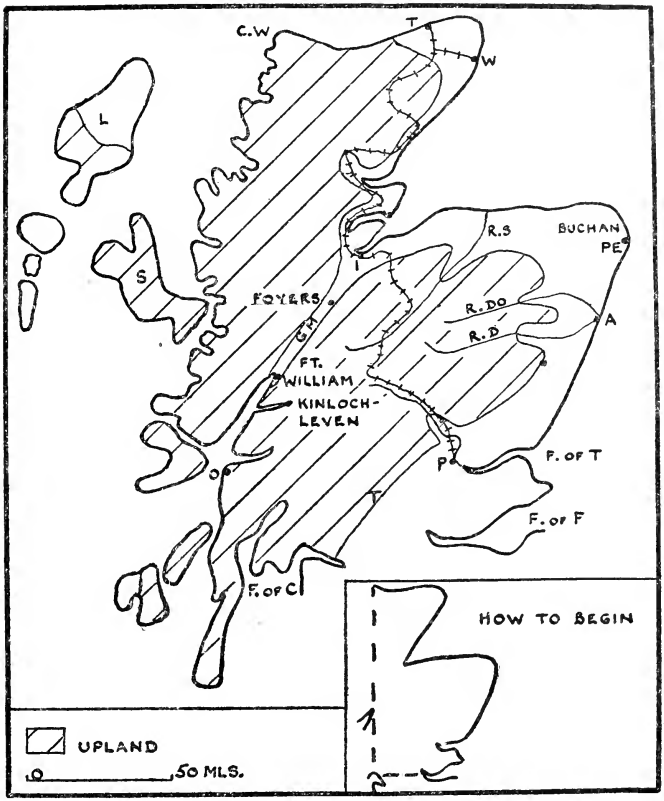


Diagram 28. Sketch-map: the Highlands of Scotland

In the valleys farmers are still to be found who, by growing oats and potatoes, keeping sheep, a few cows, some chicken, and a pig, are almost self-sufficient. If such farmers, or crofters, as they are called, live near the sea, they are fishermen as well. Crofters have been much more numerous in the past, for, at the end of the eighteenth century and later,

many landlords turned their land into sheep-walks, and the crofters were ejected. Many of them emigrated to Canada and, after about 1850, to Australia, and a magazine or newspaper of either of these two countries usually shows a large sprinkling of Scots names. The sheep-walks are large, often of thousands of acres, and the sheep are brought to lower ground during the winter. More recently some of the land has been kept as large sporting estates, used for deer-stalking, grouse-shooting, and salmon-fishing, and these to-day cover large areas. The life of the crofter is a hard one, and many of the young people are drifting to the towns or becoming gamekeepers, and are not following their fathers' occupation. However, there are industries. The railway and, within recent years, the cheap motor car have made the Highlands a tourist ground, and added to the importance of some of the towns, for example, Oban and Inverness, and of some particularly beautiful districts, such as the Trossachs. In recent years, too, hydro-electric undertakings have invaded the Highlands. There are aluminium works at Foyers, Fort William, and Kinlochleven. Alumina is found in all clays, but it is a clay called bauxite, the name derived from Les Baux, near Arles in southern France, which is the commercial source of the metal. The first stage of manufacture is carried out at Burntisland (diagram 27), using bauxite from France, and at Larne in northern Ireland, using ore from Antrim. It is the final process which takes place in the Highlands, for this requires very high power and indeed this is the sole attraction. Not only has the raw material to be imported, but there is not even a population that can be drawn upon for labour and, in addition, communications are not easy.

Question 10. What advantages have the Highlands as a source of power?

It is probable that the Highlands will be increasingly used in this way, although there is strong opposition from many

people, who hold that these undertakings will not benefit the people of the Highlands, but will ruin some of the most beautiful, unspoiled scenery in the British Isles. In their view the Highlands should be kept as a national park.

Question 11. Give the names of any countries which have national parks.

Life in the Western Isles is similar to that in the Highlands, except that farming is largely a part-time occupation, for fishing is probably the main source of income to the crofters. From one district, Harris, a part of the island of Lewis, comes Harris tweed, hand-woven from local wool, fashionable, expensive, but good.

The plain to the east forms a great contrast to the thinly peopled plateau. Grain, principally oats, and roots, mainly turnips and swedes, are grown, and cattle are reared. Sheep are not as important as cattle. The Buchan plateau, marked on diagram 28, is particularly famous for the fattening of cattle, mainly of the Aberdeen-Angus breed. In fact, the usual rotation, oats, roots, oats, grass for three years or more, is designed primarily to provide feeding stuffs. The beef is sent to the Central Lowlands and to London.

Granite is quarried in the Peterhead and Aberdeen areas. Aberdeen (=at the mouth of the Dee) is a focus of routes from north and south, as well as along the valleys of the Don and the Dee, valleys which are cultivated in their lower stretches. The town is a market for fat cattle, and was mentioned in Chapter I as a large fishing port. Other smaller fishing ports are found along the coast, for example, Peterhead and Wick. It has not been thought necessary to show obvious railway lines on the map, for example, the route from Perth to Aberdeen and to Inverness, but the line from Perth to Inverness across the Highlands has been shown, for it illustrates well the use of river valleys as routes. An atlas will show the other lines and, to most people, their fewness comes as a surprise.

The Southern Uplands.

In this sketch-map, diagram 29, it is necessary to draw some rivers, not because they are big or important, but

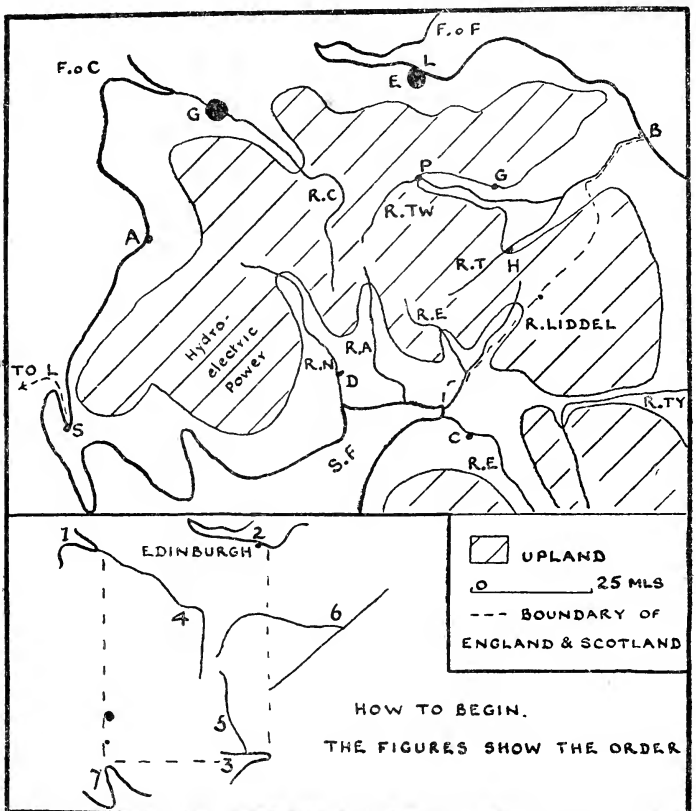


DIAGRAM 29. SKETCH-MAP: THE SOUTHERN UPLANDS OF SCOTLAND

because their valleys make valuable routes across this barrier between England and the fertile heart of Scotland. In fact, the independence of Scotland to such a late date has been ascribed to the difficulty of penetrating to the rich centre, for the routes were all easily defended. The inset

'How to begin' suggests the order in which the map should be sketched.

The Southern Uplands are lower and less rugged than the Highlands, and their smooth, green hills are famous for sheep and grouse. Hill farms of rough grass and heather are often run in conjunction with valley farms, where the sheep can be wintered. A number of small market towns, Hawick, Galashiels, and Peebles, manufacture woollens, using coal from the Central Lowlands. The industry is old, but the area was obviously at a disadvantage after the Industrial Revolution, already discussed in Chapter III. However, the industry did not die out, for competition with more favoured areas has been met by concentrating on finer quality goods, that is, where the cost of the raw material bears a smaller proportion to the final value of the article made. This means that the cost of the transport of coal or of raw material is only a small percentage of the final value of the manufactured goods. This, in turn, has had an effect on the type of sheep bred, for the factories have demanded finer wools. This has also been met by the import of fine merino wools from Australia. It may be mentioned here that the word tweed as the name for a type of woollen cloth is not derived from the river Tweed, but seems to be due to a misreading of an invoice, by a clerk, of tweels, a Scottish form of twills. The mistake, no doubt, has been of great value to this woollen-manufacturing region.

Question 12. (i) In the western plain and that bordering the Solway Firth, the rearing of dairy cattle is the main occupation, while the valleys of the Tweed and its tributaries are given over mainly to mixed farming, with oats, barley, wheat, turnips, sheep, and cattle. Explain. (Page 40.)

(ii) If the areas in the west are near the main railway lines the milk is sent to industrial cities, such as Newcastle, Liverpool, or Birmingham; if they are away from

the main lines the milk is made into butter and cheese, and sent to the same markets. Explain.

Pig-farming is common in these dairying districts, for pigs may be fed on waste products after butter and cheese have been made.

The hydro-electric power schemes in the area shown on the sketch-map supply electricity to a considerable part of south-west Scotland.

Copy from an atlas the main railway routes across the Southern Uplands: (*a*) the east coast route; (*b*) the 'Waverley' route, Carlisle, Liddel valley, Teviot valley, Tweed valley, Edinburgh; (*c*) Carlisle, Annan valley, Clyde valley, Glasgow; (*d*) Carlisle, Dumfries, Nith valley, Kilmarnock, Glasgow.

Question 13. In the Central Lowlands some three-quarters of the total population of Scotland (about five million) are found in about one-quarter of the total area. Explain.

Examination Questions

1. Draw a sketch-map of the eastern half of the Lowlands of Scotland. Mark three towns which illustrate the varied occupations of that area. Account for the main industries of each of the three towns. (Cambridge.)

2. Compare Glasgow with Edinburgh in regard to (*a*) position, (*b*) importance. Illustrate your answer with a sketch-map. (Cambridge.)

3. In the Central Lowlands of Scotland there are many industries. Enumerate four of these, say in what area they are carried on, and account for their growth. (Oxford.)

4. Select from Scotland one region where the population is large and one region where it is small, and explain why there are differences in the regions you choose. (Oxford.)

5. Suggest a division of Scotland into natural regions. Briefly describe the regions. (Bristol.)

6. Draw a sketch-map of Scotland south of the Highlands, indicating and naming:

(*a*) The general relief features.

(*b*) The rivers Clyde, Forth, Tweed, and lower Tay.

(*c*) Three coal-fields.

(*d*) One important sheep-farming area, and one important cattle-farming area.

(*e*) Greenock, Perth, Edinburgh. (London.)

7. Divide Scotland into three regions. State briefly the reasons for your divisions under the following headings: (*a*) relief, (*b*) occupations of the people. (London.)

8. Compare and contrast the eastern and western parts of the Central Lowlands of Scotland under the headings: (*a*) climate and farming, (*b*) industrial development and trade. (London.)

CHAPTER VI

WALES

WALES is a hilly peninsula; more than one-quarter is over 1,000 ft. above sea level, with but a coastal fringe of lower land. The 'Caledonian trend' in the north should be remembered, and it is well marked by the Menai Straits, and

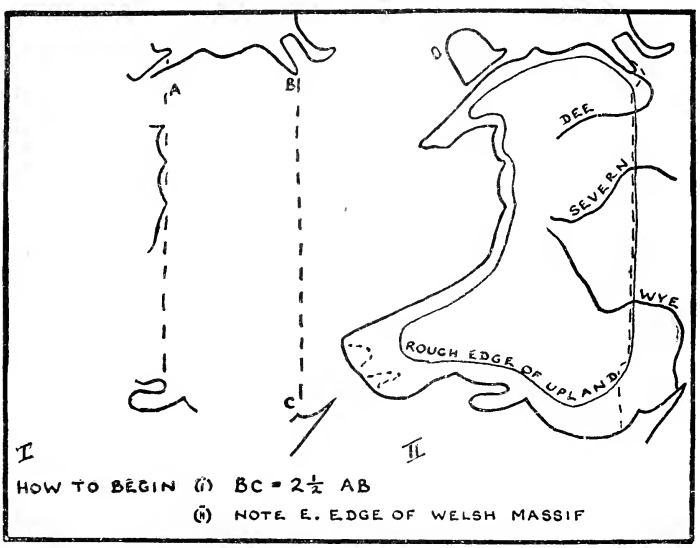


DIAGRAM 30. SKETCH-MAP: WALES. HOW TO BEGIN

by the group of mountains near Snowdon, commonly known as Snowdonia. These are wild, rugged, and with steep slopes and, although the maximum height is but 3,500 ft., the scenery here does resemble in its grandeur the far higher mountains of other lands. Further south the hills are not only lower but more rounded and gentle in outline. The whole of the Welsh 'massif' is wet, much is moorland, although bog and bare rock cover large areas. Even low

altitudes of less than 1,000 ft. may sometimes be shrouded in cloud for days on end, and it is clear that the rearing of

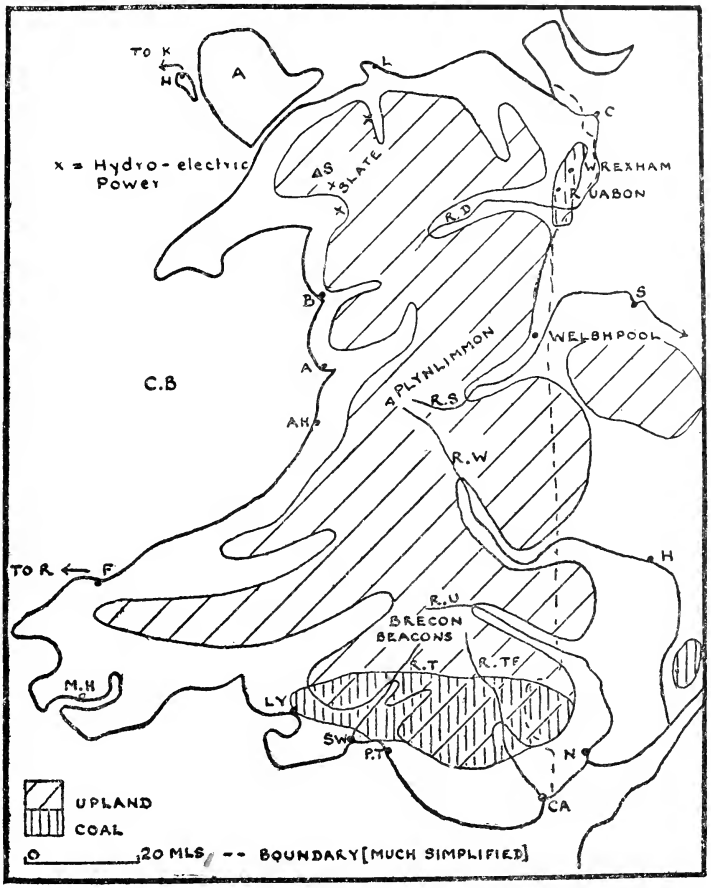


DIAGRAM 31. SKETCH-MAP: WALES

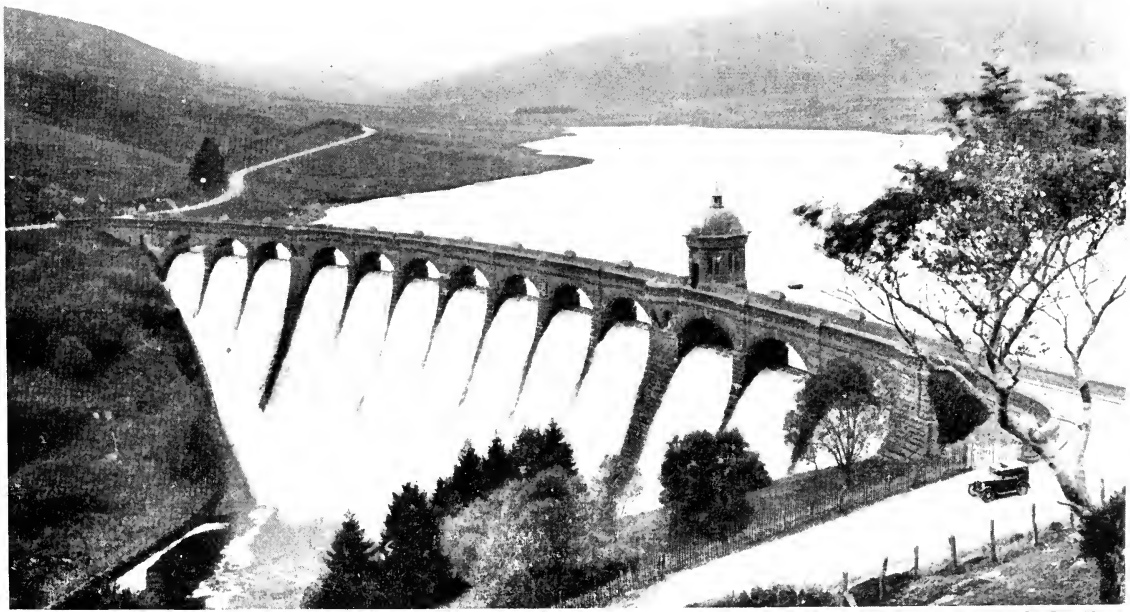
sheep is the only farming occupation possible. In fact, Wales has the greatest density of sheep per acre of any country in the world. The rough grazing varies in quality from those areas which can carry one sheep per acre to

those which must allow seven acres per sheep, and from those which are in use all the year to some which can only be used for four or five months. It is thus usual to bring the animals down to the shelter of valley farms during the winter months. The wild scenery, particularly of the higher parts, attracts many tourists in the summer, and there are also many holiday resorts along the coast: Llandudno, Barmouth, Aberdovey, Aberystwyth, and others.

Question 1. Liverpool and Birmingham get their water supply from the Welsh hills, Liverpool by damming the Vyrnwy, a tributary of the Severn, and Birmingham by damming the Elan, a tributary of the Wye. What are the advantages of Wales for this purpose?

Diagram 30 shows how to begin to draw a sketch-map of Wales and, for many purposes, map II of this diagram would be adequate, although diagram 31 is obviously better. Little can be added to the ways in which man makes use of the Welsh hills; diagram 31 shows the slate quarries and hydro-electric power schemes in the Snowdon neighbourhood. Wales has been important for woollen manufacture, but this industry is now of small account. Welshpool, in the upper Severn valley, is well known for its flannel.

The cultivated area in Wales is largely the fringe of plain along the north, west, and south coasts, and here four times as much land is under permanent grass as under the plough. Even this statement does not show fully the dominance of grass, for it is usually grown as one of the crops in the ploughland rotation. The farmers' main concern is cattle-rearing, and their small proportion of arable land is mainly under fodder crops. Wheat and barley are, naturally, rare, but oats are widely grown; turnips and swedes are the chief roots. The plains of the south and south-west are given over mainly to dairy cattle. In Anglesey beef cattle are the more important, and there is also some sheep-rearing. In the upper reaches of the Severn, Wye, and Usk mountain



P. B. Abery

RESERVOIR IN THE ELAN VALLEY, WALES. The well-watered, thinly peopled upland areas of Britain are used to provide water for the lowlands. The Elan reservoir supplies Birmingham

sheep and cattle are reared, while farther down the fattening of cattle and, to a less extent, sheep, is carried on; there is also some milk production.

Question 2. (i) Market gardening is important in the plain of South Wales.

(ii) It has been mentioned above that this area is also important for milk. Who are the customers?

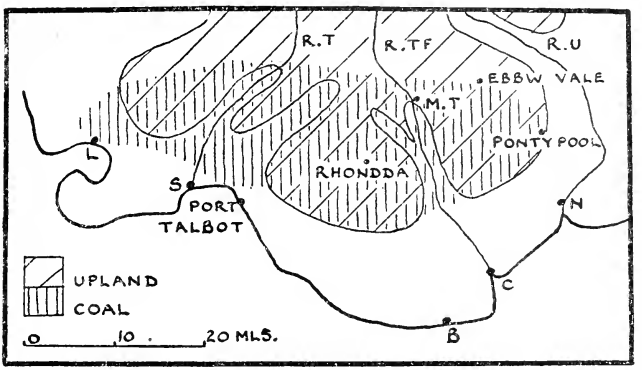


DIAGRAM 32. SKETCH-MAP: THE SOUTH WALES COAL-FIELD

Diagram 32 shows a third main region in addition to the two already mentioned. It is true that there is a small coal-field in North Wales, and there are a number of small manufacturing towns along the lower Dee valley; Wrexham and Ruabon have been marked on diagram 31. Diagram 32 shows that the southern edge of the South Wales coal-field roughly coincides with the southern edge of the highland, and it is easy to understand that the coal is more easily accessible from the narrow valleys which trench the hills than from the general plateau level.

Question 3. Diagram 33 shows the position of the coal-mines over a large part of the South Wales coal-field. What general statement can be made about their position?

The houses of the miners are huddled in the valleys near the coal-pits, and road and railway wind alongside the rivers. A walk of a mile or so takes a visitor from one of these villages on to the flat-topped, wind-swept, almost uninhabited moorland, where it is difficult to believe that

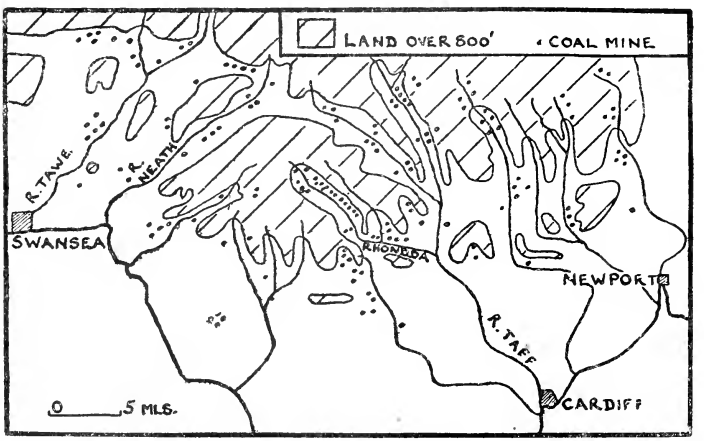
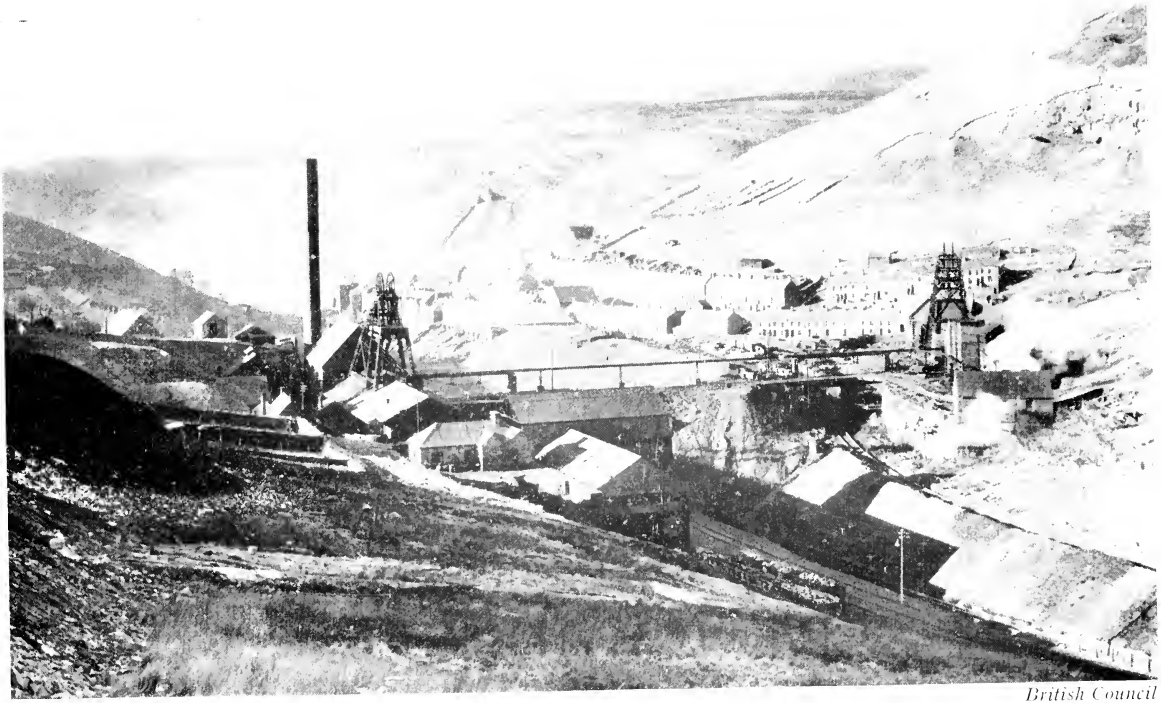


DIAGRAM 33. PART OF THE SOUTH WALES COAL-FIELD
(after Demangeon, modified)

industry is so near at hand. The majority of the pits are to be found in the valleys of the three main rivers, Tawe, Taff, and Usk, and their tributaries. First pack-horses, then canals carried the coal down the valleys to the ports at the rivers' mouths, for the railways merely replaced older methods. The ports, particularly Cardiff, export coal, for the South Wales field and that of Northumberland-Durham are the two great exporting coal-fields of Great Britain. It is possible to make a rough division of the field into three. The west roughly as far east as the Neath valley (diagram 33) produces anthracite, steam coal is produced round Rhondda, while to the east house coal is found (to remember this think of ash). Steam coal is hard, does not crush easily, but gives a good heat. It is thus an ideal coal for use in factories and in the stokeholds of ships,



British Council

A COLLIERY VILLAGE, SOUTH WALES. The colliery, the miners' houses, the railway, and the slag heaps are crowded in the valley

and deserves the name which has been given it. The coal export trade has, however, suffered from the fact that many ships to-day are built to burn oil and not coal. This has affected not only the steam coal trade, but also that of anthracite, for, forty years ago, the navies of the world, which now burn oil, burned anthracite, which had the added advantage over steam coal that it gave off very little smoke. Anthracite is to-day used in industry, for example, the local tin-plate works, and for central-heating furnaces.

Question 4. Suggest some of the reasons for the change-over of ships from coal-burning to oil-burning. [It must be remembered that, although there are motor-vessels, the majority of ships are driven by steam turbine, that is, the change is an alteration in the method of generating steam. In 1914, 90 per cent of the ships of the world burnt coal, to-day only about 40 per cent.] [Think of the number of men required in the engine-room, and the cleanliness of refuelling, and the time taken for it.]

The export trade has also been adversely affected by the development of hydro-electricity in areas, for example, Scandinavia, which were formerly very good markets.

The great industry of the South Wales coal-field is the smelting or refining of minerals. Pontypool and Merthyr Tydfil smelted iron from local ore and charcoal prior to the Industrial Revolution and, as they are on the coal-field, the substitution of coke-smelting was of no disadvantage to the industry.

Question 5. In the middle of last century a new, cheaper process of making steel was invented, but, to the iron-masters of Pontypool and Merthyr, it had the disadvantage that their local ores were useless, for they contained phosphorus, and the new process required non-phosphoric ores. The industry continued on imported ores, particularly from Spain. Steel manufacture

is *now* centred mainly in Swansea, Llanelly, Port Talbot, and Cardiff. Why should the industry have moved in this way? [It should be said that a later invention, in which phosphoric ores could be used, did not affect matters, for it was, to begin with, much more expensive.]

The Swansea, Llanelly, Port Talbot area deals with other minerals as well, tin, zinc, copper, and nickel. Here is the greatest centre of the tin-plate industry in the world. To make tin-plate a sheet of steel is dipped into a bath of molten tin, and then into palm oil to ensure an even surface. The film of tin is very thin; in fact, a tobacco or fruit 'tin' is about 98 per cent steel.

Question 6. (i) What are the disadvantages of pure tin for the making of 'tins'?

(ii) What is the disadvantage of steel for the same purpose?

(iii) There is a large export of tin-plate to Australia and Canada. Name some of the articles seen in British shops packed in Canadian and Australian tins.

It is not easy to explain the rise of the tin-plate industry in South Wales. All that can be said is that the first tin-plate factory was built at Pontypool in the early eighteenth century, using Cornish tin and local iron. When the iron and steel industry migrated in the eighties of last century that of tin-plate moved as well. Already, in fact since the late sixteenth century, there had been copper smelting, based on Cornish ore, carried on in South Wales, so that the iron, steel, and tin-plate industry came to an area already skilled in metal working. Changes have, however, occurred since this migration. Smelting of non-ferrous metals has declined for two reasons. It has been said in Chapter III that the mining of these metals is now negligible in Great Britain and Ireland, and foreign producers have found it

more economical to smelt near the mines rather than transport enormous weights of ore over the sea. Copper smelting has declined altogether, much to the advantage of Swansea, for the fumes killed the vegetation for miles around, but the slag-heaps still, unfortunately, disfigure the landscape. To-day crude copper is imported, principally from Chile. It is tin, not tin ore, which is imported for the tin-plate industry. This comes mainly from Malaya and the Dutch East Indies, and a curious point may be noticed here, that the tin reaches Swansea not direct, but via London. This aspect of the trade of London is dealt with in Chapter XVI. Zinc smelting is still carried on with supplies from Australia. Zinc is used, among other purposes, for corrugated iron, which is *steel* with a thin coating of zinc; this process is called galvanizing. Much is exported to India and other tropical countries where, because it is more durable, it is often used instead of timber. The author has seen photographs of the compound of the Negro workers in the famous Katanga mineral area of the Belgian Congo, where the huts have corrugated iron walls with thatched roofs! Nickel, imported from Canada, is the latest of the metals attracted to this great metallurgical centre. Swansea has recently added another industry to its list, the refining of petroleum. The crude oil comes in at Swansea, and is then pumped through pipe lines to the refineries at Llandarcy, just behind Swansea.

For convenience the Forest of Dean coal-field has been shown on diagram 31. This area is of historical interest as one of the great centres of the early iron industry, based on local ore and charcoal. To-day the area is unimportant.

Wales may be considered as a peninsula adjoining England, and stretching towards Ireland. The route along the north-coast plain is used by the L.M.S.R. from Euston, the railway crossing by bridges to Anglesey, and thence to Holy Island. From Holyhead ships go to Kingstown (Dun Laoghaire, pronounced Dun Leary), near Dublin. The G.W.R.

from Paddington uses the south-coast plain for its route to Fishguard, and so to Rosslare in south-eastern Ireland.

Question 7. Why have the railway companies increased the land proportion of the journey to Ireland, that is, why not Euston–Liverpool–Kingstown, or Paddington–Bristol–Rosslare? [Think of the speed of a ship.]

Milford Haven, in south-western Wales, has become one of the two great fishing ports on the west coast of Britain. The rise of the port is due to the enterprise of the G.W.R., which has provided not only good dock facilities, but also fast trains to carry the fish to market.

Question 8. (i) What is the name of the other great fishing port on the west coast of Britain; it is more important than Milford? (Chapter I.)

(ii) Milford Haven, a drowned valley, is probably the best *harbour* in the whole of the British Isles. Why has it not become an important *port*?

The Romans, who did not conquer Wales, guarded against possible attacks along the north and south coastal routes by building fortified camps, for example, at Chester and Gloucester. The Severn route was protected by Shrewsbury, a fortress town built in a river loop, and thus guarded on three sides by water. A thousand years later found the Norman attitude the same, and William the Conqueror created the three earldoms of the Welsh Marches, Chester, Shrewsbury, and Hereford, with the object of preventing the Welsh from raiding England.

Note that to-day railways go from England across the Welsh hills up the Dee valley, and so to Barmouth, and up the Severn valley, and on to Aberdovey. The Normans did, however, penetrate the southern lowlands, and Pembroke, the county in the south-west, shows this well, for the northern upland half has Welsh names and Welsh people, while the

southern lowland half has English place-names and people, with Norman castles separating the two. The county is sometimes called the 'little England beyond Wales.' Wales, before its conquest by England, was not often under the control of one man. Any mountainous country, with its valley settlements separated from one another by thinly peopled highland, is difficult to weld into a unit, and Wales is no exception. There was no town, easily reached from all parts, which would serve as a satisfactory capital. This difficulty, still present, is well shown by the fact that the University of Wales has four university colleges, at Bangor, Aberystwyth, Cardiff, and Swansea.

Question 9. (i) What can be noticed about the boundary line between Wales and England?

(ii) Welsh societies with members scattered over much of Wales often meet either at Shrewsbury or in London. Why do they do this? [The journey by rail from north to south Wales takes longer than from north or south Wales to London.]

Question 10. Examine diagram 66 or a density-of-population map in an atlas. Note that there is a region of dense population in the south, a moderately peopled coastal fringe, and a thinly peopled core. Explain; illustrate the answer with a simple sketch-map.

Examination Questions

1. State what you know of the South Wales coal-field region under the headings: (*a*) position and extent, (*b*) the development of coal-mining and the export of coal, (*c*) industries associated with coal-mining. (C.W.B.)

2. Account for the routes taken by the principal railways of Wales, noting the chief steamship connections established with Ireland. Draw a sketch-map to illustrate the answer. (Cambridge.)

3. Although comparatively scantily populated, the Highlands of Scotland and the mountains of central Wales are of value to Britain. Describe (*a*) the present use made of each of these highland areas, (*b*) the possibilities of their further development. (Cambridge.)

4. Write an orderly geographical account of either the industrial area of central Scotland or the South Wales coal-field. (London.)

CHAPTER VII

IRELAND

IRELAND is divided politically into two, Northern Ireland or Ulster, and the Irish Free State or Eire, and it is necessary to explain how this has come about. Ireland escaped both the Roman and Saxon invasions, though not the Danish, but after the Norman conquest of Great Britain, Englishmen settled in the lowlands of Ireland, particularly around Dublin. From the seventeenth century onwards large numbers of Scots Protestants were settled in the north-east, the so-called 'Plantation of Ulster.' Although, in 1800, Ireland was joined to Great Britain to form the United Kingdom, relations were never happy between the Irish and the English, and, in 1916, the southern Irish proclaimed a republic, which, after war in 1919–21, became a self-governing dominion of the British Empire. In 1937 Eire announced itself to be 'sovereign, independent, democratic.' The six north-eastern counties, with people of different descent and different creed, for Eire is mainly Roman Catholic, did not desire this, and they still send members of Parliament to Westminster, although they have also a Parliament of their own sitting at Belfast.

Diagram 2 shows some of the physical connections between Ireland and Great Britain. The mountains of the north-west are comparable with those of the Scottish Highlands, and the mountains of Mourne with the Southern Uplands. The Rift Valley of Scotland has no exact counterpart, for Antrim is a plateau caused by the upwelling of lava such as formed the line of volcanic hills in the Central Lowlands of Scotland. The Wicklow and Wexford uplands are comparable with the hills of Wales.

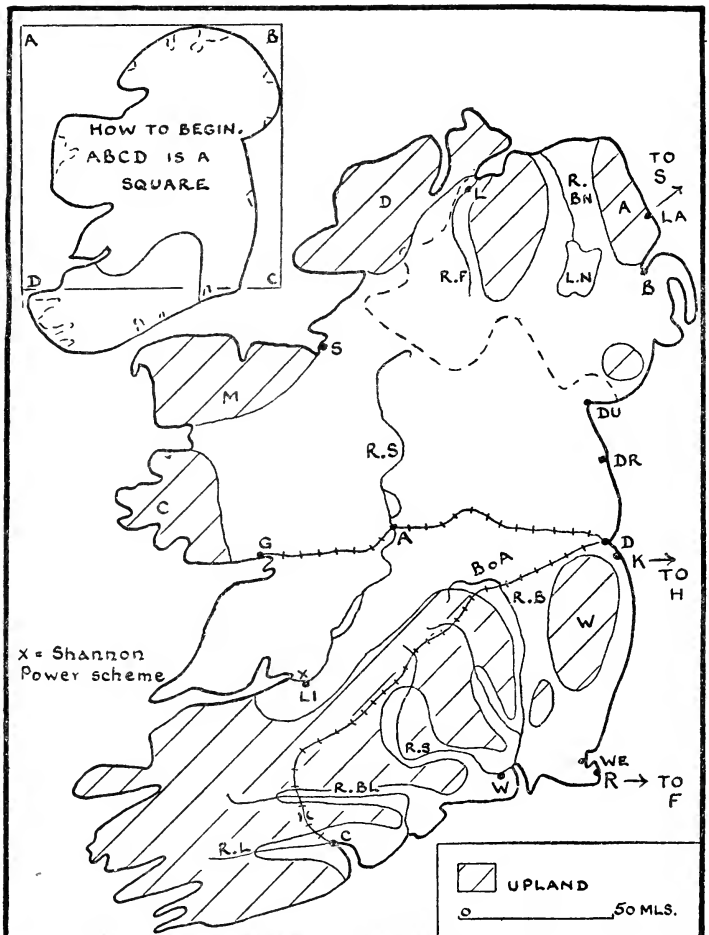


Diagram 34. Sketch-map: Ireland

The sketch-map of Ireland (diagram 34) is not easy, but a fairly accurate outline is not difficult if the suggestion 'How to begin' is followed.

It is often said that Ireland is a plain ringed by hills, and this statement does contain a germ of truth, but it needs

qualification. An atlas map will show that the ring of hills is not continuous, and the plain, particularly in the south, contains a number of hilly areas. All these upland districts usually provide rough pasture for sheep (see diagram 19). In the wild rugged highland of the north-west, in Donegal, Mayo, and Connemara, sheep can be reared only on the better-drained areas, for much is wet, boggy, almost uninhabited moorland. In the valleys of these north-western hills, crofters, as in the Highlands of Scotland and the Hebrides, practise subsistence farming and are fishermen if they live near the sea. The making of hand-made Donegal tweed may be compared with the similar industry in the Hebrides.

Much of the central plain is covered with glacial drift, and some of this is heavy clay. The land is often badly drained, and many lakes have formed in hollows in this impervious clay, and mosses have grown in the stagnant water. These have died and decayed, and others have grown over them until a bog has been formed. The dead moss has been changed to peat, an important fuel in a country almost without coal. This ill-drained bog land is not continuous, although some areas, for example, the Bog of Allen to the west of Dublin, cover many square miles. Bogs are estimated to cover about one-seventh of Ireland, and are extensive in the central plain and in the west. The Shannon, the longest river in the British Isles, winds southwards through the plain. It flows through bog-fringed lakes, and its valley is often wide and marshy.

Question 1. The Shannon forms the boundary between the old Celtic provinces of Connaught and Leinster. Why should the Shannon have become a boundary?

Coal is almost absent in Ireland, and it will be seen later that there is only one important manufacturing area, that round Belfast, in the whole of the island. Farming is thus the main industry, but, except in the well-drained drier east,

where oats are very important, and where there is even some wheat and barley, the land is given over mainly to pasture for cattle (diagrams 20, 21, 22, 23). One crop, potatoes (diagram 24), is widespread, for it is found everywhere in Ireland, except in highland or boggy areas, and, in some of the wet, sunless districts of the west, it is the only crop, other than grass, that can be successfully grown. In Eire the production of potatoes is about 17 cwt. per annum for every man, woman, and child. It is indeed a staple food to many Irish peasants, and it was the failure of the crop in the forties of last century which led to such widespread emigration, particularly to the U.S.A., that to-day there are more Irishmen in New York than in Dublin. But not all this huge potato production is used as human food, for much is given to animals, chiefly pigs. Nearly every Irish peasant has a pig or two, kept in a sty or yard near the house, and the pig has been aptly described as 'the gintleman who pays the rint.' [With regard to Bernard Shaw's statement that this description is of English origin the author can only say that Irishmen use it.] The only cereal grown, except in the drier, sunnier east, is oats, which, it has been said earlier, will grow under wetter conditions than either wheat or barley.

The mainstay of Irish farming, the rearing of cattle, will now be discussed. In Northern Ireland both beef and dairy cattle are to be found in approximately the same areas, the lowlands. In Eire, however, the position is different. Over the central plain cattle for beef are more important than dairy cattle, for the reason mentioned in Chapter IV, the difficulty of milking in farms where meadows may be inaccessible from the farmhouse because of bogs. The dairying area is the south-west (diagrams 22 and 23). Here are to be found parallel ridges of hard sandstone alternating with valleys, both running in a roughly W.S.W.–E.N.E. direction. The south-west coast has been drowned, and the ridges form rocky peninsulas, whereas the drowned

The Times

AN IRISH BOG. Tilford Bog, Antrim. Note the peat which has been cut and stacked

Topical Press

AN IRISH HOMESTEAD, KILLARNEY. The standard of life of the farm labourer is lower here than in Great Britain

valleys are 'rias.' This is a Spanish word applied to similar inlets in north-west Spain, and the term has been borrowed by geographers. It should be noted that a fiord, another borrowed term, is a glaciated inlet.

Question 2. (i) Where are fiords to be found in the British Isles?

(ii) Distinguish between the two forms of inlet, fiord and ria. (See diagram 55.)

The ridges of the south-west are sheep pastures, while the fertile valleys, particularly of Lee, Blackwater, and Suir, are the home of dairy cattle. The famous 'Golden Vale' of Limerick and Tipperary, north of these hills, may be included in this great dairy-farming district. The mild winters of these south-western valleys are of advantage. Grass will grow for a greater part of the year than in less well-favoured districts, and not only is the farmer less dependent on hay, roots, and cake, but he does not have to house the animals during the winter nights for as many months.

In this dairy-farming area the farmers have formed co-operative societies. Central creameries collect the milk and make it into butter more cheaply and efficiently than the individual farmer could possibly do. Cork and Waterford are ports for the export of butter. Little need now be added to complete the picture of Irish farming. Flax, dealt with later, is an important crop in Northern Ireland. Over all Ireland chicken are numerous, in fact, there are about six times as many chicken as there are people, and the export of eggs is large.

Question 3. (i) Why is Ireland called the Emerald Isle?

(ii) Why is the bulk of the milk produced in the south-west made into butter and not sold as milk?

(iii) Pig-rearing is very important in this southern dairy-farming area. Why? (Page 66.)

(iv) Cork imports salt and maize. For what purposes?

(v) Add another export to that of butter from Cork and Waterford.

There is but one important manufacturing area in Ireland, that of Belfast and its satellite towns. Linen is the main industry of these towns, with shipbuilding on Belfast Lough. The making of linen, as a cottage industry, has long been carried on in many parts of Ireland. The Belfast area has always been noted for it, for good flax has been grown in the valley of the Bann for centuries, and, further, it benefited by the skill of the Huguenot spinners who emigrated there at the end of the seventeenth century. Since the introduction of power-driven machines Belfast and the nearby towns have become the most important area in the world, producing about one-third of the linen of the world. Flax (Latin *linum*), a thin-stemmed plant, growing to a height of some two to three feet, must be pulled up, not cut, an operation still sometimes done by hand, although a machine has been invented to do it. It is then 'retted' in water for a week or ten days, and the suitability of the water for this purpose is obviously a main factor. The stalk is then dried, and the fibre separated from the woody part of the stem. All this is done before the flax is sent to the factories, which, however, to-day have to supplement local supplies with imports from the Baltic states, U.S.S.R., and Belgium. Belfast is one of the major shipbuilding areas of the British Isles, although not so great as those of the Clyde (Chapter V), or of north-east England (Chapter VIII).

Question 4. (i) Belfast has not, like the Clyde, an iron and steel industry near by, and fuel and steel are imported from Cumberland and western Scotland. This is not a serious disadvantage. Why not?

(ii) Shipbuilding is a man's job. Where do the women of Belfast work?

Other manufacturing centres in Ireland are Dublin, with the great Guinness brewery, the largest in the world, an industry based on a good water supply and locally grown barley; Londonderry, a small port on Lough Foyle, making shirts and collars; Cork, Waterford, Wexford, and Limerick, with bacon, ham, and butter. Ford cars and Fordson tractors are made just outside Cork. Falls on the Shannon near Limerick are used to generate electricity, which is now taken by the 'grid' to all parts of Eire. This may stimulate manufacture.

Question 5. Dublin imports barley and hops. Why?

Bogs make communications difficult in much of the Irish plain but, fortunately, there are some well-drained sandy or gravelly glacial deposits, lying roughly east and west, which have made railway construction easier. Note the railway from Dublin to Galway which, crossing well-drained land, makes for Athlone, a small market town situated where the Shannon valley, which is often marshy or boggy, may be easily crossed. The mountains of the south, despite their W.S.W.–E.N.E. grain, are crossed by the railway from Dublin to Cork through the Mallow gap.

Question 6. The trade of Eire is almost entirely with Great Britain. The important exports are cattle (principally from Dublin to Liverpool), bacon, ham, butter, and beer; the imports are wheat, maize, coal, and manufactured goods. Explain the nature of the trade, and why it is so exclusively with Great Britain.

Question 7. Why should Dublin be a more important port than Limerick?

Question 8. Although agriculture is the chief industry in Northern Ireland, as in Eire, farming produce is not exported to the same extent. Explain.

Question 9. Northern Ireland is about one-sixth the area of all Ireland, but has about one-third of all the people.

Explain. [Population: Eire, 3,000,000; Northern Ireland, 1,250,000.]

Question 10. The suggestion has been made that Galway should be used as a passenger port for North America, i.e. that passengers should come from New York to London via Galway, Dublin, and Holyhead. What advantage would this give? [It may be pointed out that shipping companies with their offices already set up in other ports are not likely to agree to change their routes, and that much would have to be done to Galway to make it comparable with Southampton.]

Question 11. Contrast the distribution of population in Ireland with that in Scotland. [Examine either diagram 66 or a map of distribution of population in an atlas. Note: (*a*) Scotland and Ireland are about the same size, but Scotland, with five million, has more people than Ireland; (*b*) in Scotland the Central Lowlands are densely peopled (about three-quarters of the people in one-quarter of the area), whereas the Highlands and Southern Uplands are thinly peopled; (*c*) in Ireland, boggy or upland areas are thinly peopled, but there is only one extensive densely peopled district, that around Belfast.]

Examination Questions

1. What geographical factors help to explain the importance of the export of linen textiles from Belfast, of livestock from Dublin, and of dairy produce from Cork? Why is the major portion of the external trade of Ireland carried on with Great Britain? (Cambridge.)

2. Describe the cattle-rearing and associated occupations of Ireland, noting how geographical factors have influenced them. (Cambridge.)

3. Briefly describe the physical features and climate of

Ireland, and show what importance these have had on (*a*) the use of the land, and (*b*) the distribution of population. (Oxford.)

4. Describe and account for the distribution in *either* Scotland *or* Ireland of the following: (*a*) cattle, (*b*) sheep, (*c*) cereals. (Cambridge.)

5. Describe the physical features, the climate, and the typical occupations of the people of *two* of the following areas: the Scottish Highlands, the central plain of Ireland, the Southern Uplands of Scotland. (London.)

6. Give reasoned geographical accounts of *two* of the following: (*a*) iron and steel production in South Wales, (*b*) fishing on the east coast of Great Britain, (*c*) cattle rearing and dairying in Eire. (London.)

7. Choose two of the major physical regions of Ireland which are dissimilar, and note the points of geographical contrast between them. (London.)

CHAPTER VIII

NORTHERN ENGLAND

By northern England is meant the Pennines, the rich manufacturing and farming areas which lie on their flanks, and the Lake District. The Pennine upland stretches for about 150 miles from Tyne to Trent, and has a width of some 20–40 miles. In Chapter I it was shown that the Pennines are an upward fold of rock layers, although, on the west, the edge of the Pennines is often marked by a fault; the fault to the east of the Eden valley, with a steep slope from over 2,000 ft. down to about 800 ft., is one of the most impressive sights in England. The whole of the Pennines are remarkably smooth in outline. The highest part is in the north, with many summits over 2,000 ft., and some over 3,000 ft., while in the centre it is much lower, with an average height of some 1,000 ft. In the south the hills rise again to the Peak, about 2,000 ft. high. It has been pointed out earlier that all this is above the level of cultivation, and thus the nature of the rock is more important than differences of height. Diagram 35 shows that north and south of the Aire is the sandstone known as millstone grit, because millstones were made from it, whereas elsewhere limestone predominates. This is important. The limestone, because of its porous nature and varying solubility, often gives bare rock surfaces, steep-sided gorges, and caves, a type of scenery sometimes called 'karst,' from the name of an area in the north-west Balkans of similar character. Elsewhere it is covered with thin turf, and gives grassy moors, which are divided by stone walls into vast sheep pastures. The 'grit' moors, on the other hand, often have sour soil, heather, and peat bogs, and are almost uninhabited. The streams, however, provide soft, lime-free water for the textile in-

The Times

THE PENNINES. Upper Ribblesdale with Whernside (2,400 feet high) in the distance. Stone walls divide the fields

dustries on both flanks, and a water supply for the dense town population in the manufacturing areas. An atlas will show that the Pennines are crossed by railways in many

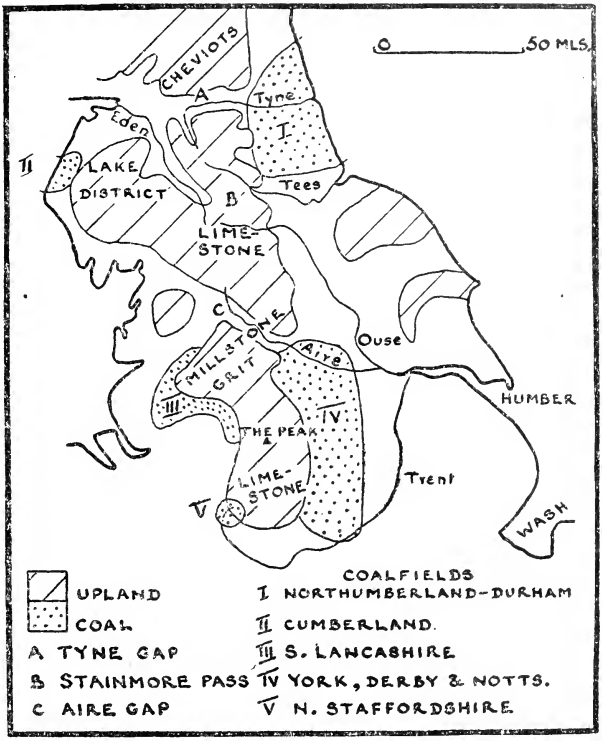


Diagram 35. Northern England

places: the main routes are, from north to south, the Tyne, Stainmore, and Aire gaps (diagram 35).

Cumbria. The Lake District and the nearby lowlands are often considered under the name Cumbria (diagram 36). The geological history is complicated, but it is sufficient to say that the area is a dome of old rocks once covered with

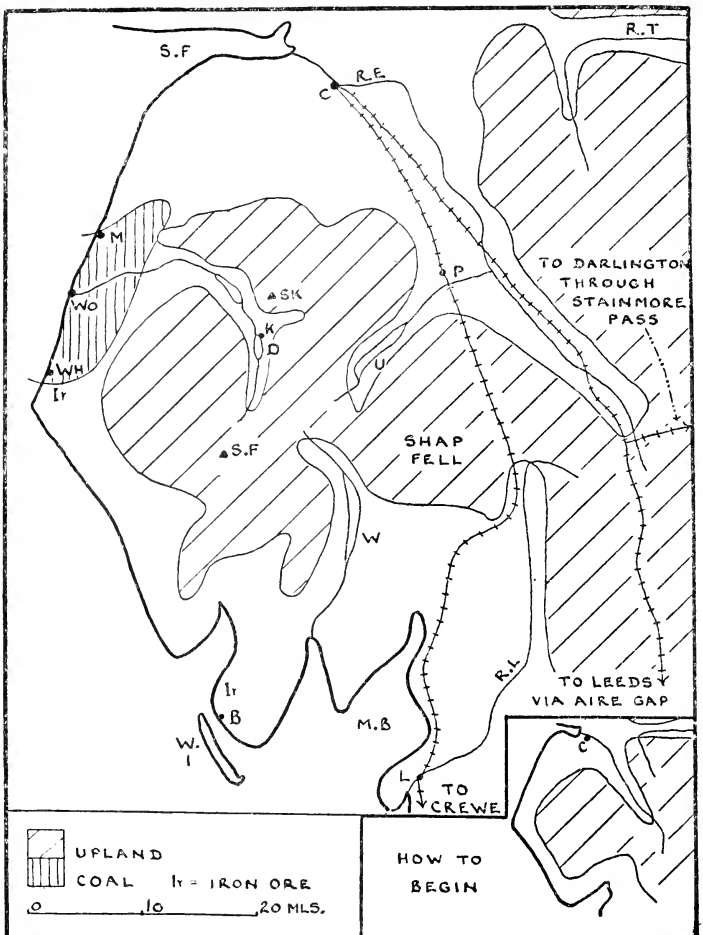


DIAGRAM 36. SKETCH-MAP: CUMBRIA

newer sedimentary rocks, which have now been worn away, except at the outer edges. The old hard rock thus now protrudes through a series of skins of newer layers. The dome shape has resulted in rivers flowing outwards from Scafell, 'eight vallies . . . like spokes from the nave of a

wheel,' as Wordsworth expressed it (diagram 37). The lakes are long and narrow, with steep valley sides rising almost sheer from the water. Some are in rock basins, but others are due to the damming of the valleys by glacial drift. The upland area is the wettest in England, with rain-

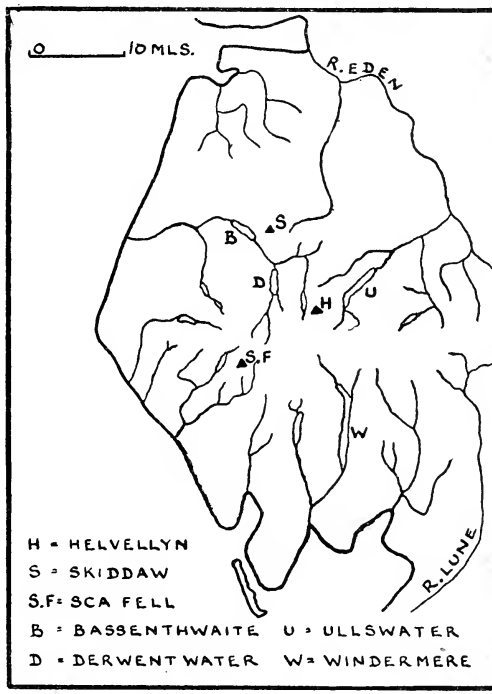


Diagram 37. The Radial Drainage of the Lake District

falls reaching 150 inches per annum, and sheep rearing is the only possible farming occupation on the hills. Even so the sheep have to be brought down to the shelter of the valley farms in winter. In the narrow valleys some potatoes and swedes are grown, but the main occupation is the rearing of dairy cattle on the damp pastures, and their milk is sent to Liverpool from the southern valleys, and to

Newcastle from the northern. The Lake District is one of great beauty. Cascades tumble down the mountain sides; and differences of rocks, slates, grit, volcanic material, and glacial drift give rise to diversity of upland scenery. There is the further contrast between the wildness of the hills and the rich green of the valleys. Naturally, the tourist industry is important. Despite its low height compared with mountain areas in other parts of the world, the Lake District affords fine sport even to good mountaineers. Small market towns, for example, Keswick, nestling in the valleys, are often holiday centres as well. But there are other ways in which man makes use of the Lake District. Slate is quarried, and the area is, like so many other highland regions of Britain, used as a source of water; Manchester obtains its water supply from Thirlmere and Haweswater. Within recent years Government afforestation has been started on the lower slopes, not without opposition from people who hold that this destroys the rugged beauty. Some of the Lake District is under National Trust control, and many think that the whole of it should be conserved as a national park.

But indeed Cumbria is a district of contrasts. Not only is there diversity in the Lake District itself, but there are contrasts between it and the Eden lowlands, and between both and the industrial area of the Cumberland coal-field.

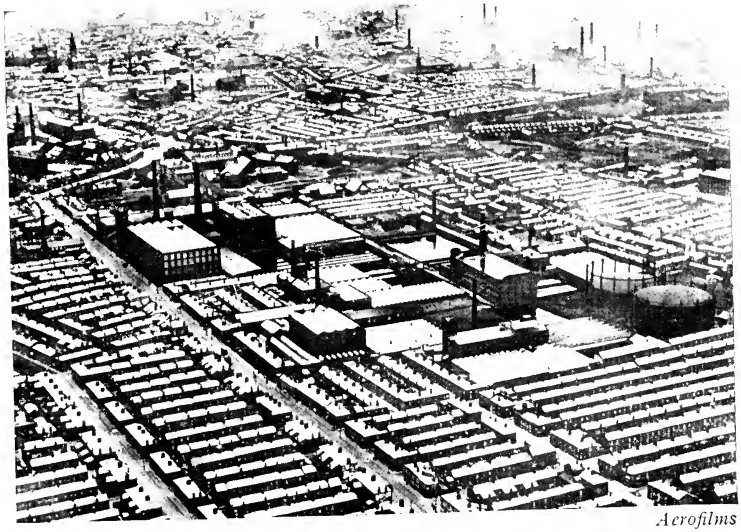
> *Question 1.* The nearby plains are naturally drier than the Lake District; for example, Whitehaven, 42 in. of rain per annum, but Carlisle only 32 in. per annum. Why is Carlisle drier than Whitehaven?

Luckily the Eden valley has not only a small rainfall for the west of England, but also a good, well-drained soil, and thus arable farming, with oats, turnips, swedes, and potatoes, is carried on. Sheep are also reared.

The Cumberland coal-field is small, and the hidden field is here under the sea, so that some of the galleries in the

H. J. Smith

THE LAKE DISTRICT. Wastwater, Cumberland



Aerofilms

AN INDUSTRIAL TOWN (Lancashire). The photograph shows the cotton mills and the tightly packed homes of the mill-workers

coal-mines are as much as four miles from the coast. There is an iron and steel industry, for rich iron ore is near by, there is coal for power, and coke was easily obtained from the Durham field, for it is only recently that improved technique has allowed of the use of local coal. Local iron ore is now supplemented with imports from north Spain.

Question 2. Give the name of one area supplied with Cumberland fuel and steel. (Chapter VII.)

Barrow-in-Furness (in Lancashire), the largest town in Cumbria, owes its importance to local supplies of rich iron ore, and, as in Cumberland, coke was easily obtained. The industry dates back only some seventy years, and the rise of the town may be compared with the mushroom growth of so many cities in western North America. Barrow is one of the major shipbuilding districts of the British Isles, for the stretch of water behind Walney Island is well sheltered.

Carlisle, on a bluff overlooking the Eden, is the second largest town, and grew up as a stronghold against Scottish invasion. It has some small manufactures, biscuits, woollens, and engineering. The sketch-map shows the main railways converging on the town from the south. It will be noticed that no railway makes its way north and south across the Lake District, and the western line has a difficult journey, rising to nearly 1,000 ft., over Shap Fell.

Question 3. Using diagram 36 and the map already drawn of the Southern Uplands, draw a sketch-map showing the routes converging on Carlisle. [Remember that there is a railway from Newcastle through the Tyne gap.]

The West Pennine Plain.

The plain to the west of the Pennines (diagram 38) is very thickly peopled, with a density between the Ribble and the Mersey unequalled in any other industrial region of Britain.

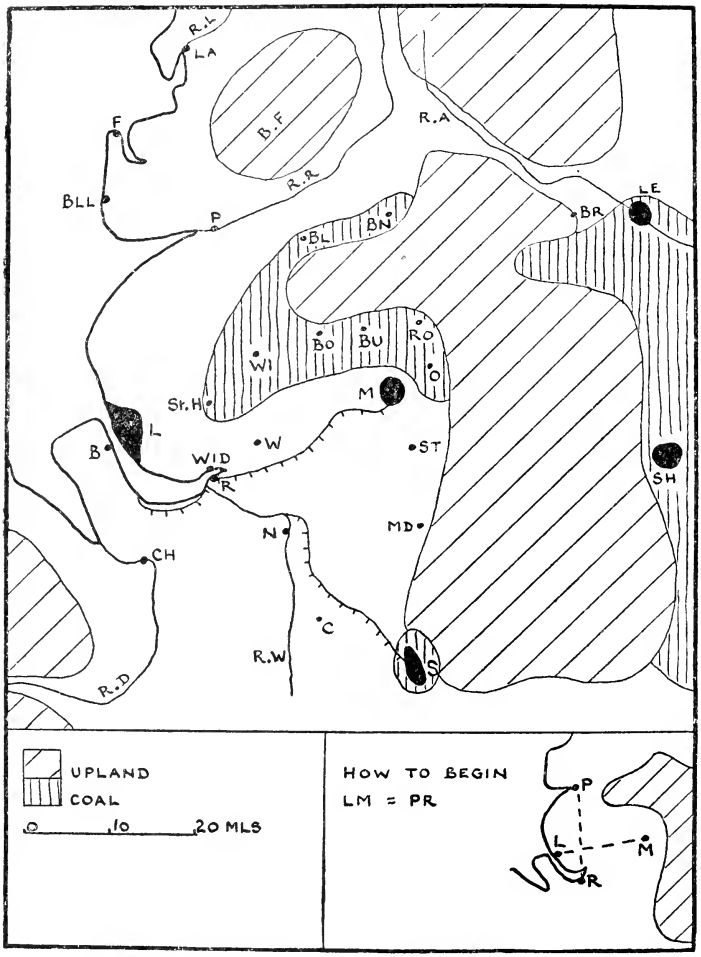


Diagram 38. Sketch-map: the West Pennine Plain

It is to be expected that a lowland to the west, particularly one near great manufacturing areas, would be important for dairy cattle. North of the Ribble and south of the Mersey this is true, but between these two rivers is a tract of rich, deep, well-drained, loamy soils, where arable farming is all-important, and where cattle are few. It is one of the great areas of the country for potatoes (diagram 24) and oats (diagram 21), and some wheat is also grown. Market gardening is, naturally, widespread. One other point may be added, the enormous number of chicken kept in the Ribble valley, and in the district between Preston and Lancaster.

South Lancashire is the greatest area in the world for the manufacture of cotton, with about one-quarter of the spindles of the world. It has been stated in Chapter III that the making of woollen goods was a widespread domestic industry, and was to be found in districts where wool and soft water were available. Soft water from the 'grit' areas and wool from Pennine sheep led to the growth of woollen manufacture on both flanks of the Pennines, in Lancashire on the west and Yorkshire on the east. Cotton, probably first introduced from the Levant in the thirteenth century, was used as an adulterant in wool, but when it was spun separately it was found that the damper atmosphere of the west was of advantage, for the fibre was not prone to snap. Thus, on the west, woollens were gradually ousted by cottons. It is inaccurate to suggest, as is often done, that the damp atmosphere is the cause of the cotton industry of Lancashire, for the area would not have manufactured cottons had there not been a former woollen trade. To-day the moisture of the air in factories can be regulated by humidifiers, machines which spray water into the air. It is clear from what has been said that cotton was made in Lancashire before the Industrial Revolution; it was fortunate, from the point of view of the industry, that coal was near at hand when the steam engine was invented.

Question 4. The following is a rough division of the industry. The wetter ring of towns round Manchester, that is, Bolton, Bury, Rochdale, Oldham, Stockport, deal mainly with spinning, while the drier towns, Preston, Blackburn, Burnley, are concerned mainly with weaving. Explain why the southern group is the wetter. [Think of the direction of the rainy winds.]

Manchester, sometimes called 'Cottonopolis,' is the commercial centre of the industry, the town where cotton is bought and sold, rather than where it is made, and this position has been strengthened since the opening of the Manchester Ship Canal in 1894. Important though cotton is, it is not the only manufacture, for engineering, particularly textile machinery, is found in all the 'cotton' towns. It is somewhat ironic that this machinery, sold abroad as well as to local factories, is the main cause for the decline in Lancashire's exports. Thirty years ago India imported the colossal total of 3,000 million yards of cotton fabric goods every year, and nearly all of it was English. Before the war the import had dropped to one-quarter of this figure, and over one-half of that came from Japan! Both India and Japan bought their machinery from Lancashire firms, and sent their young men to the technical schools of the great 'cotton' towns to learn the trade. It may be added here that at Trafford Park, Manchester, are the works of Metro-Vickers, the greatest centre of the electrical industry in the country.

Further south, in the Weaver valley, lie beds of salt, some 100 ft. thick, and situated 200–500 ft. below the surface. The salt is not mined, but is obtained by letting water into the beds and pumping up the brine. Salt is valuable not only for its use as a food, but because it forms the basis of chemical industries. Northwich, Runcorn, and Widnes have great chemical works, and the bleaching products are of particular value to the cotton-manufacturing region to

the north. The making of soap, at Widnes, Port Sunlight (near Birkenhead), and Warrington; of glass at St. Helens; and of artificial silk at Stockport, Manchester, and other 'cotton' towns, may be considered as branches of the chemical industry. Soap is made from caustic soda, a product of chemical factories, and oils, such as whale, palm, olive, ground-nut, and coco-nut. These are placed in a tank, heated by steam forced into them from pipes which line the sides of the tank, and so changed into soap.

Question 5. The great soap factory of Port Sunlight was built in 1888 on some fields at Birkenhead. Give the reasons why Lever (later Lord Leverhulme) started his factory here. [Think of (*a*) raw materials, (*b*) labour, (*c*) cost of factory, (*d*) communications.]

Question 6. The raw materials of artificial silk are, either wood-pulp or short fibre cotton, and chemicals. Enormous quantities of soft water are necessary. Most of the artificial silk factories of the country are in Lancashire. Suggest reasons why this should be so. [It should be noted that there is a real silk industry in Macclesfield (Cheshire) and nearby towns.]

One other industry must be added in this region, that of shipbuilding at Birkenhead.

The north Staffordshire coal-field, that is, the area round Stoke, is more commonly called the Potteries. Pottery was not easy to transport, and thus it was a widespread domestic industry, carried on wherever there was suitable clay and wood for firing. It is not easy to explain why the Stoke area has become the most important district in the British Isles, while most of the others have lost their trade. It is true that coal is found here, but it seems likely that the work of certain men, particularly the Wedgwoods, was really responsible for its present position. The Pottery area has gradually grown as the open clay quarries have been followed, until to-day it is a sprawling district some ten miles

long and two-thirds of a mile wide. Local clay is still used, but for finer work the materials are obtained elsewhere, for example, china clay from Cornwall and Devon (Chapter XIV), ball clay from Dorset, flints from Norfolk and Normandy. The canal (Trent and Mersey) from the Mersey estuary to Stoke is used for the transport of some of these raw materials. Although it is correct to emphasize the pottery industry here, black-band ironstones are still worked, and there is iron and steel manufacture.

The great port of the west Pennine plain is Liverpool, second only to London in the total volume of its trade and first in the British Isles and in the world if exports only are considered. It is not possible until other regions have been discussed to understand fully the work of this port, but some obvious imports and exports may be shown on the sketch-map, for example, food, raw cotton, oils coming in, and cotton goods going out. It will be clear that Liverpool shares the trade of the Midlands as well as of the Yorkshire, Derbyshire, and Nottinghamshire coal-field to the east of the Pennines. The town has industries due to its greatness as a port, for example, milling, sugar refining, metal-smelting, especially of tin.

Question 7. There is a large import of food into Liverpool, not only from North America, for example, wheat and meat, but also from Ireland. What food is imported from Ireland? (Chapter VII.)

Question 8. Liverpool has not always been the great port of this region, for until the middle of the eighteenth century Chester was the more important. Silting of the Dee was one of the causes of the decline of Chester and the rise of Liverpool. Examine the shapes of the two estuaries, and suggest why the Dee should have silted.

The opening of the Manchester Ship Canal, already mentioned, added another seaport to the area. It might

be thought that all the raw cotton would now come to Manchester and not to Liverpool, and that cotton piece goods would be exported mainly through Manchester. Changes of this type, however, come but slowly, for there are many old-established firms in Liverpool dealing with cotton, and they have retained their trade. About twice as much raw cotton comes to Liverpool as comes to Manchester.

The main L.M.S.R. line through Crewe, Warrington, Wigan (a coal-mining town), Preston (a small port as well as a 'cotton' town), and Lancaster (=Roman fort on river Lune) should be shown on the sketch-map. Crewe, in the Midland Gate between the Welsh hills and the Pennines, is an example of a town which owes its very existence to the railways, for a century ago there was not even a village here. Not only is it an important junction but, because of this, it has been made the site of railway workshops.

Question 9. From an atlas find the routes which converge on Crewe.

The people of the west Pennine plain are fortunate in the choice open to them of holiday resorts. The upland districts of north Wales, of Lakeland, and of the Pennines are easily reached, and great seaside towns, such as Blackpool, have grown up on the coasts. Many people, too, go to the Isle of Man, which has not only good bathing, but fine hill walks as well.

The East Pennine Plain. (i) *The North-eastern Region.*

It has been said in Chapter III that the Northumberland-Durham coal-field (diagram 39) is known to be one of the earliest worked in the country. The coal was easy to mine, it was usually near rivers, and the average distance from pit to port was about ten miles. It is not surprising that sending 'sea-cole' to other parts of England developed early. Here indeed was born the idea, before the introduction of the steam engine, of wagons with flanged wheels on iron

rails running downhill to the ports, and often by their weight pulling up empty wagons. The transport of coal by coasting

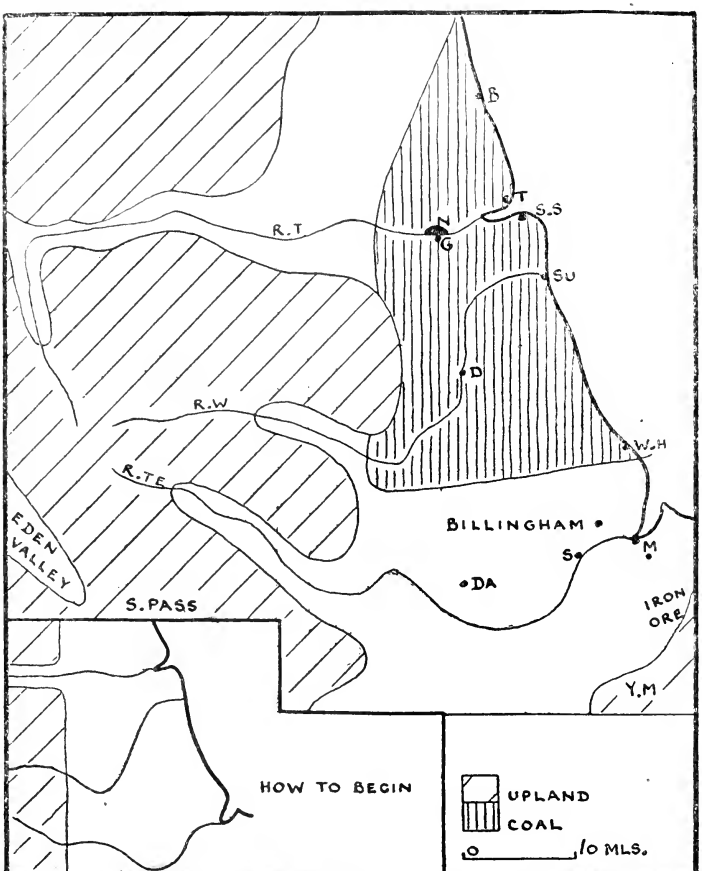


Diagram 39. Sketch-map: North-eastern England

steamer to other parts of the country still persists and, in addition, about one-third of the coal is exported, principally across the North Sea to Scandinavia. Changes have occurred recently in the mining of this field. Some of the

best seams in the older pits are nearly worked out, and new pits are being sunk in the south-eastern 'hidden' part of the field (diagram 16). As in Cumberland, there are workings underneath the sea up to about four miles from the coast.

Black-band ironstones stimulated an iron and steel industry on the coal-field, but this is concentrated to-day at Middlesbrough, which, with Cleveland iron ore and Durham coke and limestone, had obvious advantages. The town has grown rapidly, for a hundred years ago it was but a village, while to-day it has a population of 140,000. Its manufactures are mainly of heavy goods, such as rails and girders; Swedish iron ore now matters more than local supplies.

Question 10. Two of the British coal-fields are pre-eminent for the export of coal. The Northumberland-Durham field is one, which is the other? (Chapter VI.)

Question 11. The great industry on the Northumberland-Durham coal-field is shipbuilding, and the area rivals the Clyde. From what has been said what type of ship was probably first made?

Ships are made on the sheltered estuaries of the Tyne, Wear, and Tees, and at Hartlepool. The Tyne, with Newcastle, South Shields, and others, is the greatest of these districts. Sunderland, on the Wear, a river with a rocky bed, which could not be dredged, concentrates on smaller ships, colliers and tramps. Marine engineering, as on the Clyde, has become a valuable adjunct of the shipbuilding trade. Although it is accurate to stress here the importance of shipbuilding and allied trades, other iron and steel products are also made. Railway locomotives and rails are manufactured mainly on Tyneside and, at Teesmouth, as mentioned above, girders for bridges and buildings; the steelwork of the famous Sydney Bridge came from here.

There are deposits of salt in the Tees valley, and a large

I.C.I. (Imperial Chemical Industries) factory at Billingham, near Stockton. Here also is a huge plant for the manufacture of oil from coal, a process which may help, in the future, to absorb the coal now that the export trade is of less account (see page 73).

As might be expected, the bulk of the people in this north-eastern region are to be found concentrated round the estuaries, and the coastal strips adjoining them.

Newcastle, in spite of its name, is an old town. The adjective 'new' was given to it by the Normans, who built a castle on the site that the Romans had used a thousand years earlier. At Wallsend near Newcastle was the *end* of Hadrian's *wall*, built across England by the Romans to keep out the Scots. To-day Newcastle, roughly in the centre of the coal area, is a port, a manufacturing town, and the lowest bridge point on the Tyne. It is also at the junction of the important route to Scotland, east of the Pennines, and that from Carlisle through the Tyne gap.

> *Question 12.* The east coast route to Scotland was, until the coming of the railways, far more important than that to the west of the Pennines. Why?

Durham, in a great curve of the Wear, and some seventy feet above the river, was first settled by monks during the period of Viking raids. Surrounded on three sides by water, it was difficult of access, but its advantage then has become a disadvantage in modern times, particularly as the Wear cannot be dredged, and it is to-day but a small cathedral and university town.

There are no special features in the farming to which it is necessary to call attention. It is an area of mixed farming, with oats, wheat, potatoes, and turnips as the chief crops, and where sheep, cattle, and pigs are reared. It is of interest that the Tees valley is the original home of the Shorthorn, the most famous British breed of cattle, which was developed here about 1780.

The East Pennine Plain. (ii) *The Yorkshire, Derbyshire, and Nottinghamshire Coal-field.*

The extent of the coal-mining area of the York, Derby,

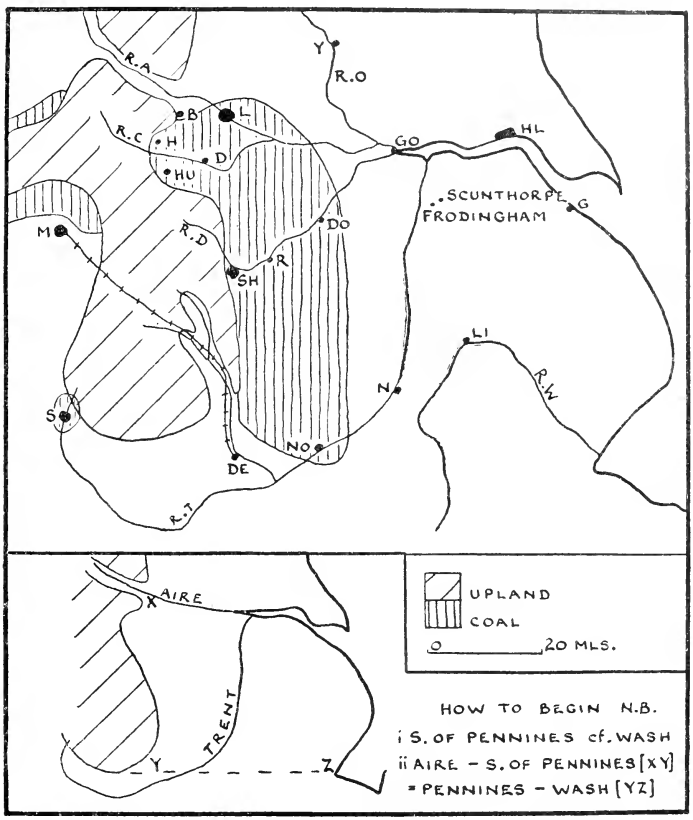


DIAGRAM 40. SKETCH-MAP: THE YORKSHIRE, DERBYSHIRE, AND NOTTINGHAMSHIRE COAL-FIELD

and Nottingham field is shown on diagram 40; diagram 16 shows the concealed or hidden part of the field and, within recent years, it is this that has come into prominence. It is possible to divide the manufacturing areas of this great

field into three. To the north, round Leeds, Bradford, Halifax, Huddersfield, Dewsbury, and other smaller towns, lies the greatest woollen manufacturing district of the world. It has been stated earlier that the industry is old, for it had the wool and soft water necessary, although in its early days it was not the greatest area of the country. To-day most of the wool is imported, principally from Australia, for local supplies have been outgrown. There is not the specialization in either spinning or weaving which was mentioned in the discussion of the Lancashire cotton towns, although there is some specialization in the type of woollen goods made. The most important town is Bradford; Huddersfield is famed for its high-class cloth; Halifax is noted for carpets; while Dewsbury and towns near by specialize in the manufacture of cloth from 'shoddy' (shoddy is wool derived from rags, i.e. the wool has been used before). Leeds is the greatest town of the region—note its foothill position at the entrance of the Aire gap—but it is not now a principal centre for woollens. Ready-made clothing and engineering both employ more workers than woollens do. As in Lancashire, textile machinery is made in all the towns mentioned, in fact, the towns of the cotton area to the west of the Pennines and those of the woollen district to the east form one of the great engineering provinces of the country.

The second division of this great field is the district round Sheffield. Here again the industry is old, for the manufacture of iron and steel goods from local iron ore smelted with charcoal goes back to the twelfth century. Chaucer, in the *Reeve's Tale*, mentions that Symkyn the miller carried a Sheffield knife. The nearby millstone grit, suitable for grindstones, may explain the importance of cutlery and edge tools generally. To-day the work may be divided into two classes: (*a*) cutlery and other small articles, such as tools and clock springs; (*b*) heavy steel trades, including machinery, armour-plating, and guns. There is one common factor in these seemingly dissimilar sides to the trade—

a specialization on the finest type of goods; and, indeed, the newer type steels, for example, stainless, which are now made, illustrate the same idea. The fine quality iron and steel, necessary for so much of the work of Sheffield, is imported from abroad, principally from Sweden.

Question 13. Sheffield has, to-day, no local iron ore, and is farther from the sea than most British coal-fields. These are the causes of her specialization. Explain more fully. [The answer, if forgotten, is in Chapter V, on the Southern Uplands of Scotland.]

Rotherham, with blast furnaces and steel mills, and Doncaster, with engineering works, may be thought of as part of this central zone of the coal-field.

It may be added here that the industrial districts of south Yorkshire, that is, of the area round Leeds and Bradford, and that round Sheffield, lie in the part of the county known as the West Riding. (Riding=third part; the other two are the North Riding and the East Riding.)

There is not the same specialization in the southern part of the coal-field; the towns have many manufactures. Nottingham has been famous for lace, which was a cottage industry as far back as the sixteenth century, but to-day lace is of small importance, and its place has been taken by other varieties of knitted goods, pullovers, socks, and stockings. In the Middle Ages smiths worked local ores with Sherwood charcoal, and thus laid the foundation of the modern manufacture of cycle and motor machinery. In Nottingham, too, are the great factories of Player (tobacco) and Boot (medicines); Derby is famous for Rolls-Royce cars and aeroplane engines and for pottery, and it is the site of a L.M.S. railway workshop.

Question 14. Suggest reasons why Derby was chosen as the site of a railway works.

The fact that 90 per cent of the iron-ore production of the British Isles is in the line of limestone hills has already been

stated, and two important centres in the area under discussion, Scunthorpe and Frodingham, have been marked on the sketch-map. These make pig-iron, which is sent to Yorkshire, Lancashire, Staffordshire, and even Scotland.

The position of Hull and Grimsby as the two greatest fishing ports of the country has been emphasized in Chapter I. Fish, when brought in by British ships, do not rank as an import, so that ordinary trade figures do not show fully the importance of these towns. The other trade of the Humber is shared mainly by Hull, Grimsby, and Goole, with Hull as the greatest. Grimsby and Goole export coal and import timber, largely pit-props, but Hull has a much more general trade. It imports butter, bacon, timber, and oil-seeds, the last a relic of the days when it was a whaling port, and dealt in whale oil. It might seem obvious to add wool to the list, but it will be explained later in Chapter XVI that, although Hull does import wool, the bulk comes by coasting steamer from London, the greatest wool-importing port of the British Isles. It should be easy to understand that Hull will not only export the goods of the nearby industrial districts, but that products from Lancashire or the Midlands, if destined for north-west Europe, are usually exported through Hull as well.

Question 15. (i) What are the countries of origin of the butter, bacon, and timber? (See Chapter V if answer not known.)

(ii) Give another example of an important raw material coming to a manufacturing district via London. (See Chapter VI.)

The main L.M.S.R. and L.N.E.R. lines should be shown on the sketch-map; they are easily found from an atlas, or may be copied from diagram 64. The trans-Pennine line from Derby to Manchester using the valley of the Derwent has been shown. Canals and canalized rivers are used here more than in other parts of Great Britain and Ireland.

Examples are the Aire and Calder to Leeds and Wakefield, and the Don to Sheffield, but the cross-Pennine canals with long tunnels and many locks are little used (diagram 43). It is bulky goods that are carried by water, such as coal outwards and grain and timber in.

A Regional Division of Yorkshire.

Yorkshire, the largest county in Britain, has within its

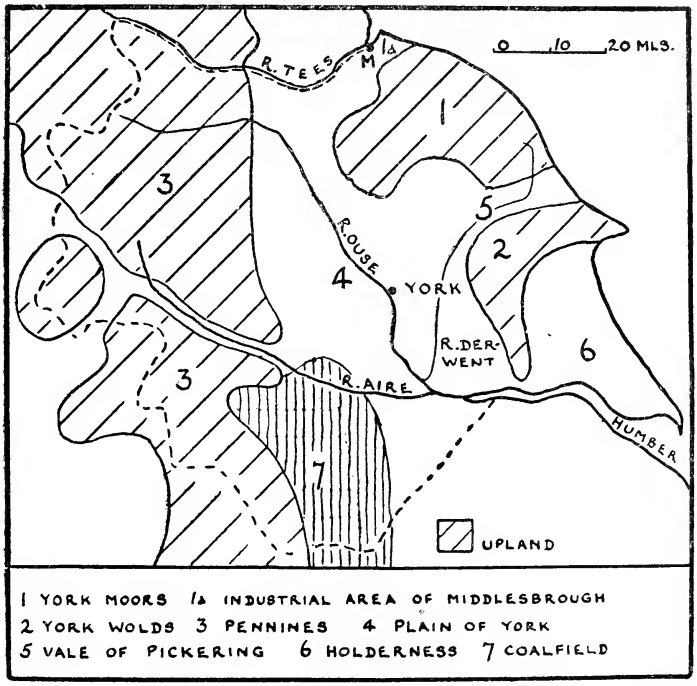


Diagram 41. Yorkshire: the Main Regions

boundary part of the lowland of south-east England, part of the highland zone of Great Britain, and a great industrial area. Thus in one county is to be found an epitome of Britain, and it has been chosen as an example of the way any district may be divided into regions (diagram 41).

1. *The York Moors or Cleveland Hills.* This is a thinly peopled, heather-covered moorland, with some sheep and cattle. Much rises to over 1,500 ft. Middlesbrough and the nearby iron mines form the only important district.

2. *The York Wolds.* These hills are of chalk, and make steep cliffs at Flamborough Head. They are lower than the hills to the north, and are cultivated on the 'sheep and corn' system described in Chapter IV.

3. *The Pennines.* A general description of the Pennine upland was given at the beginning of this chapter, and diagram 35 shows that it is possible to make subdivisions. The Pennine tributaries of the Ouse flow in steep-sided valleys called 'dales.' Here sheep and beef cattle are reared, for the land is mainly under grass. Market towns are to be found at the foot of the dales, and here the beef cattle are bought by lowland farmers to be fattened on their richer pasture.

4. *The Vale of York.* Yorkshire is often called the 'county of broad acres,' and it is the vale of York which is thought of when this term is used. As a whole this pleasant rolling plain, with much morainic material, is a fertile agricultural region. Some is low-lying, and, although drained, is still liable to flood. The Northallerton Gate, the northern exit of the vale between the Pennines and the Cleveland Hills, is only ten miles wide. It is not necessary for most purposes to make any subdivision of this plain and none has been shown on the map. However, there are differences. In the north, that is, around Northallerton, the soil is heavy clay; wheat and roots are grown, and bullocks and some dairy cows reared. Further south the soil is lighter and, in general, gives not only good cereals, but also such crops as potatoes, carrots, and beet. The light land also suits pigs and poultry. A third division may be made. Along the banks of the lower Ouse and Derwent, where the rivers are tidal, their flooding has left a rich deposit of alluvium on

which wheat, oats, potatoes, sugar-beet, flax, and vegetables give heavy crops. So rich is this area that land elsewhere is artificially flooded so as to gain fertility from the river mud. The population of the vale of York is almost entirely agricultural, and it is a land of villages and small market towns whose positions have been chosen in the past with an eye to the possibility of flooding. The largest town is York. It is on high ground, above flood level, and was, in the Middle Ages, accessible to small sea-going vessels. The Ouse at York breaks through a low, roughly east-to-west moraine only about fifty feet high, which made and still makes a good east-to-west route. The Romans, who had a soldier's eye for a good position, made York their northern military capital, for it was within reach of their northern frontier: it still is an important army depot. Later the town became an ecclesiastical centre and, until the Industrial Revolution, was the chief town of northern England. To-day York is not only a market town and shopping centre for the plain, but is a tourist centre as well. It has some manufactures, for example, chocolate, but it is difficult to find any satisfactory geographical explanation for their presence.

5. *The Vale of Pickering.* The centre of this vale is an old glacial lake bed, and is still ill-drained and liable to winter floods.

> *Question 16.* The centre is mainly meadow-land with cattle, while there is a ring of arable land growing cereals and animal fodder crops. The main villages form a rough circle. Nearly all the roads and railways do not cross the centre. Explain.

6. *Holderness.* This is, on the whole, a highly cultivated region, with wheat and barley, but some tracts of ill-drained land are given over to bullock-feeding.

7. *The Industrial Region.* This has already been discussed and it is clear that subdivisions could be made if necessary.

Examination Questions

1. (*a*) On the outline map of north England and south Scotland provided:

(i) Shade in pencil and name Cheviots, Sidlaw Hills, Yorkshire Moors.

(ii) Insert and name the rivers Clyde, Eden, Tees, Tweed.

(iii) Mark in ink and name the Northumberland and Durham coal-field, and the Cumberland coal-field.

(iv) Mark areas important for dairy cattle (D), fruit (F), potatoes (P), salt (S), wheat (W). Use the letters to indicate the areas, *one* area for each.

(v) Mark with a dot and name Barrow-in-Furness, Carlisle, Stranraer, also one seaport on the Firth of Forth, one on the Tyne, and one on the Humber.

(*b*) Write a brief account of the trade of *one* of the three eastern ports marked. (Cambridge.)

2. What geographical factors have contributed to the development of important textile industries in south Lancashire and the West Riding of Yorkshire? Draw a sketch-map giving details of *one* of these textile areas. (Cambridge.)

3. Draw a sketch-map to illustrate the position of the coal-fields either *east* of the Pennines or *west* of the Pennines. Select one of the coal-fields shown, and briefly describe the industries associated with it. (Cambridge.)

4. Draw a large sketch-map of the coal-field of *either* Northumberland *or* south Lancashire, inserting four towns on the coal-field. Select two dissimilar industries of the region, describe where they are and the factors contributing to their development. (Cambridge.)

5. Examine the following figures and explain the differences.

	Density of population per sq. mile
The Eden valley	250
The Pennines	less than 1
The north-east coast of England	over 500 (Oxford.)

6. Locate four coal-fields adjoining or near to the Pennines and give a reasoned account of the industrial development of *one* of them. (London.)

7. Draw a large sketch-map of north-east England (east of the Pennine watershed and north of a line through the Humber) indicating and naming:

(*a*) The Pennines, Cleveland Hills, and the Yorkshire Wolds.

(*b*) The rivers Tyne, Tees, Ouse, and Aire.

(*c*) One coal-field and one iron-mining district.

(*d*) One shipbuilding centre and one woollen manufacturing district.

(*e*) The main L.N.E.R. line to Scotland and three important towns on it. (London.)

8. Suggest a regional division of Yorkshire and state briefly the chief distinguishing characteristics of each division. (London.)

9. Draw a sketch-map of the area which drains into the Humber estuary, indicating and naming:

(*a*) The main relief features.

(*b*) The rivers Aire, Don, and Trent.

(*c*) The chief coal-fields.

(*d*) One important steel manufacturing and one pottery manufacturing area.

(*e*) Hull, Nottingham, Bradford, York. (London.)

10. Compare the Northumberland coal-field with the South Wales coal-field with regard to (*a*) position, (*b*) industrial activities, (*c*) export trade. (N.U.J.B.)

11. Name the principal industries in each of the towns: Belfast, Dundee, and Sheffield. Describe the ways in which *two* of the principal industries in each town have been favoured by local conditions. (C.W.B.)

CHAPTER IX

THE MIDLANDS

THE Midlands, or the Midland Triangle, is the area bounded on the north by the Pennines, on the east by the limestone hills, and on the west by the Welsh Massif (diagram 42). Three main streams drain the region, Trent, Severn, and Avon. An atlas will show that low hills rise above the general level of the plain; these, which include the coal-fields, are areas of harder rock which have resisted weathering. The greatest town is Birmingham. It grew up as a market town in a farming district, and in it, using local iron ore and charcoal from nearby Cannock Chase, were made bits, nails, horse-shoes, and farm implements. Its smiths are mentioned as early as 1538, and in 1607 'Bremicham' was described by the author Camden as swarming with inhabitants and echoing with the noise of anvils. When the smelting of iron by coal was introduced in the middle of the eighteenth century the coal-field to the west, for Birmingham is not on the field, had coal and iron in the same measures, and limestone near at hand. It was this district, round Walsall, Wednesbury, West Bromwich, and Dudley, which became known as the 'Black Country.' 'At night it is lurid with the flames of iron-furnaces; by day it appears one vast loosely knit town of humble homes amid cinder-heaps and fields stripped of vegetation by smoke and fumes' (Mackinder). But this description which explains how the name 'Black Country' arose is not true to-day; the iron ore is hardly worked, coal is now principally mined in the northern 'hidden' part of the field, and but few blast-furnaces are at work. The iron used to-day comes from the limestone hills, mainly from the area round Corby, Wellingborough, and Kettering shown on

the map, and the steel from South Wales and Sheffield. In discussing South Wales it was pointed out how the list of metals smelted or refined in the Swansea neighbourhood

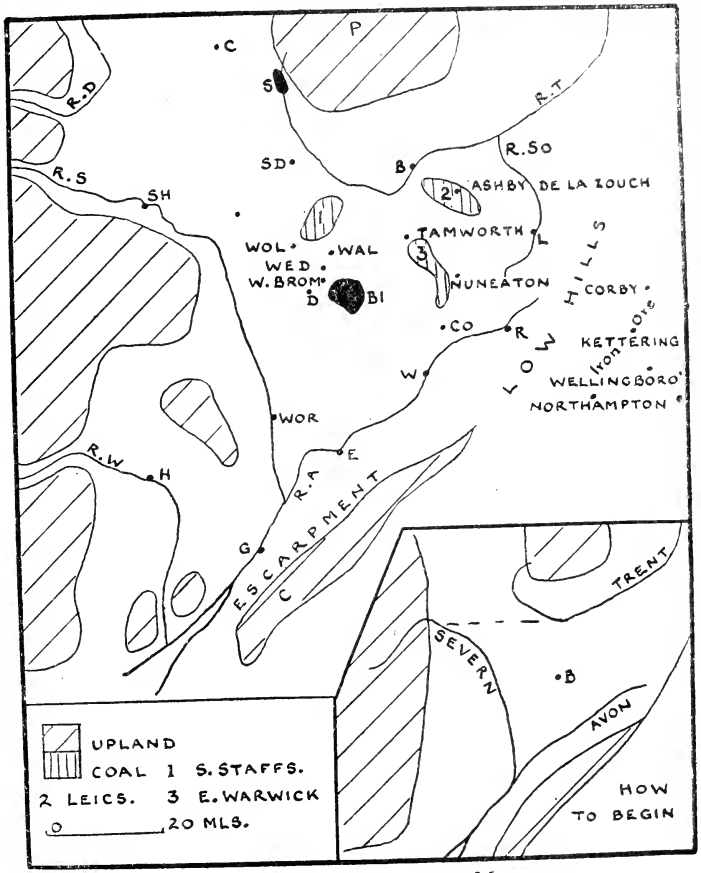


Diagram 42. Sketch-map: the Midlands

has increased or, in other words, how a district already famous attracts other industries of the same type. The same feature is to be seen here. The making of brass was developed in Birmingham early in the seventeenth century,

for it had a thriving iron and steel industry. Since then bronze, gold, silver, electro-plating, and, recently, aluminium have been added. To-day Birmingham, Dudley, Wolverhampton, and Walsall are hardly separate towns at all, for they are linked by strings of houses.

Question 1. (i) Birmingham, not on the coal-field, was already specializing in small valuable articles at the time when the heavy iron industry was in the Black Country. Why?

(ii) The whole region of Birmingham and the old Black Country concentrates to-day on articles where the cost of the raw material is but a small proportion of their final value: cars, cycles, electrical apparatus, wireless sets, jewellery, brass-work, nails, screws, tyres. Why has the old Black Country also developed in this way? [Think of (*a*) raw materials necessary, (*b*) distance of coal-field from sea.]

Diagram 42 show that coal is mined in other parts of the Midland plain, and these smaller fields have helped in the rise of manufactures in certain towns. The small Shropshire field, west of that of south Staffordshire, and bordering the Welsh hills, has been omitted from the map, for, although it was, at one time, a minor Black Country, it is now of small account. It was the first area to use coal smelting of iron ore and one town name, Ironbridge, commemorates the first iron bridge ever built, that over the Severn in 1779. On the East Warwick field coal is mined near Nuneaton and Tamworth, but it is largely sent away for domestic use. The largest town of the area is Coventry, once famous for silk, then for machinery for silks, and now for motor cars and artificial silk. In the Leicestershire coal-field, Ashby and Coalville are mining centres, but the biggest town of the neighbourhood, Leicester, is not on the field. Leicester, whose wool was rated highly for hosiery as far back as the thirteenth century, has retained its importance for this

trade, although silk and artificial silk hosiery and, indeed, knitted goods generally have been added. Boots and shoes, with leather from local cattle, are also made. Rugby makes electrical apparatus, but it is difficult to find any geographical reason for the location of the industry here. Burton-on-Trent is famous for beer, in fact, Burton is the name of a variety of beer. The presence of gypsum in the local water makes it peculiarly suitable for brewing, so much so that in other towns where beer is made gypsum is often added to the water, a process to which the ugly name 'burtonization' has been applied.

Question 2. The soils of the Midland Triangle are very varied, but milk production and market gardening are widespread. Explain.

On areas of lighter soil, where dairying and market gardening cannot be successfully practised, for example, in eastern Shropshire, wheat, barley, and roots are grown. Some special districts may be added to this broad outline. Fattening pastures for beef cattle are found in the Soar valley, in the plain of Hereford and adjacent tracts in the Severn valley, and to the south of Warwick. In the last of these milk production is now taking precedence over that of beef. The plain of Hereford is famous too for cider and perry, and is the only district, outside the south-eastern counties, where hops are an important crop. The fertile Vale of Evesham, that is, the part of the Avon valley round that town, is rich in orchards, particularly of plum. Vegetables are often grown in the orchards between the lines of fruit trees.

Question 3.

Taffy was a Welshman, Taffy was a thief,
Taffy came to my house, and stole a leg of beef.

This is an English saying: explain Taffy's temptation.

Birmingham is almost equidistant from the estuaries of Humber, Mersey, Thames, and Severn, and thus the ports of

Hull, Liverpool, London, and Bristol all compete for 'Black Country' trade. This industrial area is farther from the sea than other British manufacturing districts, and thus water transport is more used here than elsewhere: diagram 43 shows the main canals.

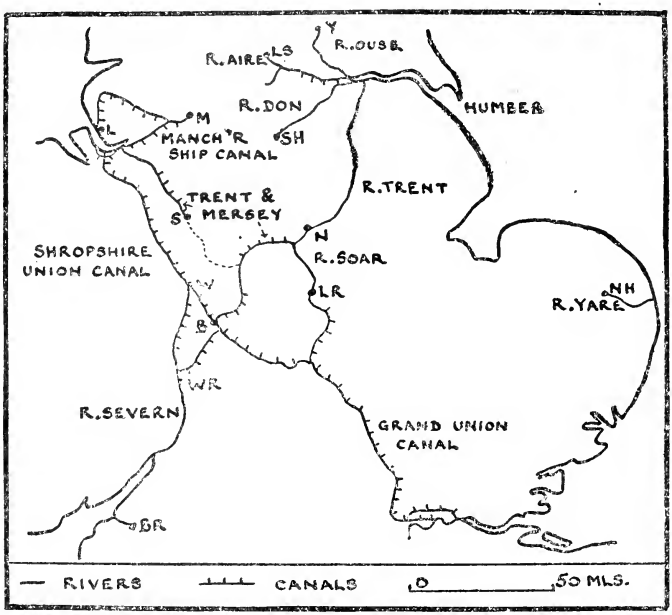


DIAGRAM 43. THE MAIN CANALS AND NAVIGABLE RIVERS OF ENGLAND
(Canals which are not much used are omitted)

Main line railways should be shown on the sketch-map, at least the G.W.R. (from Paddington) through Warwick, Birmingham, Wolverhampton, Shrewsbury, and out of the map to Chester; and the L.M.S.R. (from Euston) through Rugby, Stafford, and Crewe (the L.M.S.R. also has a route from Rugby through Coventry, Birmingham, and Wolverhampton, rejoining the main line at Stafford).

Question 4. Birmingham has a very good service of trains. What reason is there for this?

It will be noted that Bristol and not Gloucester has been named above as the port of the Severn. The upper estuary of the Severn is shallow and impeded with sandbanks, and although Gloucester was the rival of Bristol when ships were smaller, it is so no longer. Gloucester is a market centre, and has some manufactures, for example, tanning and iron, whose roots are old. It is the lowest road crossing of the river, but not now the lowest rail crossing.

Examination Questions

1. Show by means of a sketch-map the names and positions of *either* (*a*) the Midland coal-fields of England, *or* (*b*) the coal-fields of the Scottish Lowlands. Describe and account for the chief industrial activities of the people on *one* of the coal-fields shown on your map. (Cambridge.)

2. Account for the importance of three of the following towns: Birmingham, Leeds, Sheffield, Cardiff, Dundee, Belfast. (Bristol.)

3. Describe the general relief, the drainage system, and the chief manufacturing industries of the Midlands of England (bounded by the Welsh mountains, the Pennines, and the Jurassic escarpments). (London.)

CHAPTER X

THE SCARPLANDS

In Chapter I a broad division of Great Britain was made between the highland region of the north-west and the lowland zone of the south-east. This lowland is not a flat monotonous plain, for it is crossed by low hills. An earlier diagram (No. 4) marked the chalk and limestone area of this lowland, but it has been thought better on diagram 44 to show the chalk and *Jurassic* layers. The latter, so named from a similar rock formation in the Jura mountains of Europe, are made up of sandstones and clays as well as limestones. The author has found intelligent boys puzzled by the existence of a woollen industry in the Cotswolds because they thought of these hills as limestone only, that is, as an area of hard water. The truth is that the water used comes from sandy layers. The chalk, limestone, and some of the sandstones, although not hard, have not been worn away as easily as the clay, and this is the reason why they stand up as hills. South-east England was slightly tilted by earth movements during the Alpine period of mountain building (diagram 2), and this has brought about the steep scarp slope, usually on the west or north-west, and the more gentle or dip-slope on the opposite side (diagram 45). It will be seen from diagram 44 that the scarps of the North and South Downs face inwards, that is, they are exceptions to the general statement just made. The explanation of this will be given later. Because of this scarp feature the area under discussion is sometimes called the Scarplands of England. The lines of hills are not continuous. North of the Cotswolds, for example, the hills are low and the scarp often absent, and north of the Chilterns the chalk broadens out into a low plateau, often covered with glacial deposits, which is indeed higher than the Fens to the west, but which

does not show a scarp slope. Further north the chalk is broken by the Wash and the Humber.

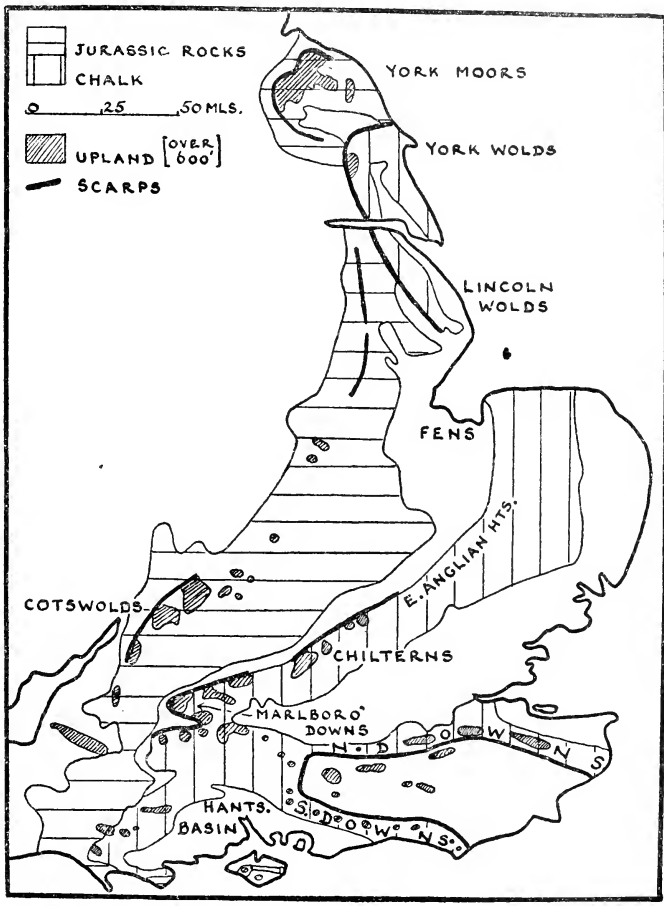


Diagram 44. The Scarplands

Diagram 44 shows the scarps, and the slope is often steep, as in the Cotswolds, the Chilterns, and parts of the North and South Downs. From the crest of the Chilterns, for

example, on a clear day, a magnificent view looking westwards may be had. The chalk hills drop steeply at one's feet, and faintly in the distance across the clay vale may be seen, some forty miles away, the rise of the Cotswolds.

The clay is impervious, but water sinks easily through the porous chalk or limestone, and the section shows that water will come to the surface as a spring where the porous

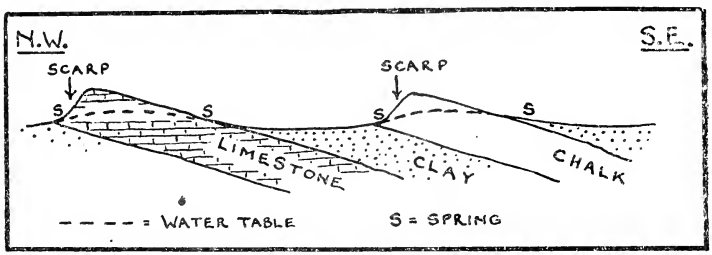


Diagram 45. Section across the Scarplands showing the Alternation of Ridges and Clay Vales

rocks rest on the non-porous. This is the explanation of the 'spring-line' villages so often found on both flanks of the hills. It has already been pointed out that big towns to-day may get their water from distant hills, but early peoples did not settle in a district unless their water supply was assured.

Question 1. Where do Manchester, Liverpool, Birmingham, and Bradford obtain their water? (Chapters VI and VIII.)

An additional attraction to the early settler of the spring-line villages was that the soil was mixed, for rain had washed down the limestone or chalk on to the clay. This soil was not so light and poor as the limestone or chalk, but was easier to work than the heavy clay. It was also pointed out in Chapter I that movement along the hills was easier than over the densely forested lowlands. It may be added that farms to-day often include in their area meadows on the

damp clay, arable fields on the mixed soil, and downland above.

Detail of the farming in the scarplands will be given later in the individual chapters, and a broad statement will be sufficient here. Between the two main lines of hills the land is often of heavy clay well suited to cattle pastures, and arable farming is only important where the soils are lighter. The G.W.R., which serves a part of this clay vale, is often called the 'Milky Way.' East Anglia, that is, roughly the counties of Norfolk and Suffolk, and a part of Essex, has not this heavy clay soil, for it has been said already that much of it is a low chalk plateau masked by chalky boulder clay; here arable farming is supreme.

Question 2. (i) On the hills 'sheep and corn' farming, or some modification, is usually practised. What does this mean? (Chapter IV.)

(ii) What is used in the making of cement? (Chapter III.)

(iii) What stone was used in the building of St. Paul's Cathedral. (Chapter III.)

(iv) What are the main areas for iron ore in the line of limestone hills? (Chapters III, VIII, and IX.)

It will be clear that subdivisions of the scarplands may be made: these are the region in the south-east within the horse-shoe of the North and South Downs, the London Basin inside the V of North Downs and Chilterns, the Hampshire Basin, and the clay vale and East Anglia already mentioned. These will now be considered.

CHAPTER XI

EAST ANGLIA: THE FENS

THE area shown on diagram 46 is one of farming villages and small market towns. Coal is absent and the main emphasis of the chapter is on farming, not on manufacture. There is no high land, but on the sketch-map the chalk and limestone scarps have been shown, and the clay vale which lies between. The scarps are sometimes very faint, for example, to the east of the Fens. In Huntingdonshire, south Cambridgeshire, and Bedfordshire the clay vale is covered with chalky boulder clay, and is under arable farming and market gardening rather than grass. In Bedfordshire, along the banks of the Ouse, there is an area of fertile, deep, easily worked soils, well known for market gardening, with potatoes, sprouts, cauliflower, peas, beans, onions, and lettuce.

Question 1. Suggest the likely places of sale of the produce of this rich market-gardening area.

It has already been mentioned that East Anglia, that is, the counties of Norfolk and Suffolk, and a part of Essex, has been covered with glacial drift too. Low chalk cliffs are, however, to be seen at Hunstanton. East Anglia is mainly low plateau country, and, in olden days, it was isolated by sea to north and east, by fen to the west, and by Essex forest to the south. Even to-day this isolation has not entirely disappeared, for no route from outside passes through East Anglia to another part of England. This area also is under arable farming, with wheat, barley, oats, sugar-beet, and other roots (Chapter IV). About three-quarters of the sugar-beet of the country is grown here. It may be added that barley is usually grown on the lighter, sandier

soils, and wheat on heavier, richer land. There has been some flax-growing in recent years. The harvest is a little earlier than those of wheat and barley so that the crop seems

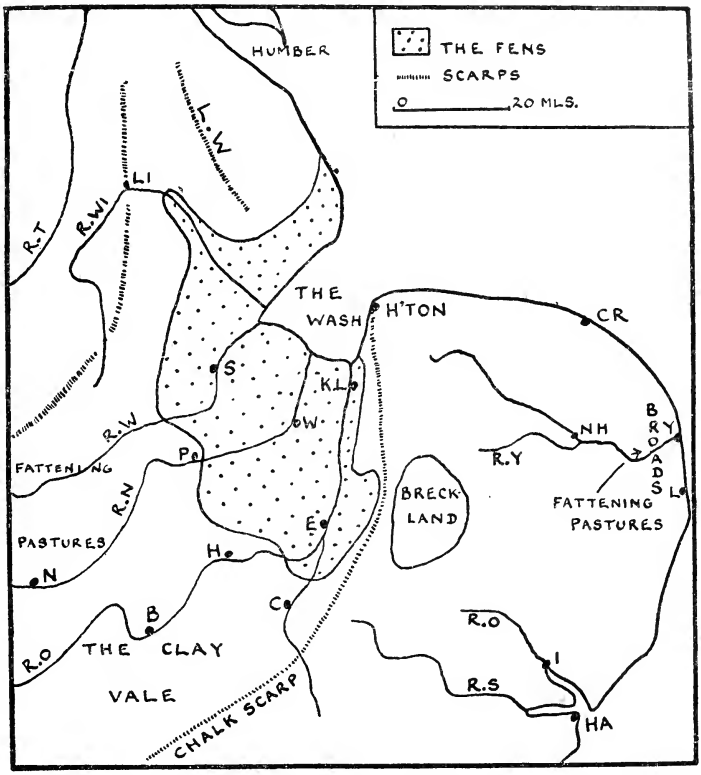


DIAGRAM 46. SKETCH-MAP: THE FENS, EAST ANGLIA
(The scarps would be better shown in pencil, coloured for choice, and not as above)

a suitable addition to the rotation. Farmers have, however, found one disadvantage, that flax when ripe is easily beaten down by rain, and that when this happens, hand-pulling may have to be used. Not only is this expensive, but it takes time, and the farmer may find that his men are

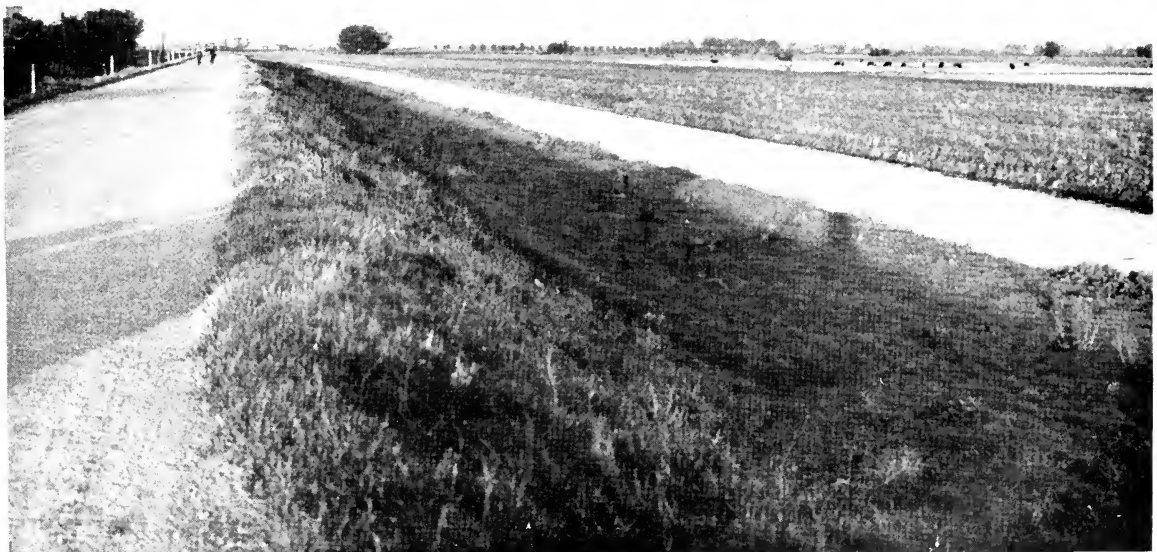
still working on the flax when he wants them for wheat and barley harvests. It is thus difficult to say what the future of flax will be.

Question 2. Sheep and cattle are also reared. Write a short account of this. (Chapter IV.)

Some special areas must now be described.

The Fens. After the Ice Age the Wash must have been much bigger than it is to-day, with a number of small islands rising above the sea. Then gradually changes took place. The currents of the North Sea, with their speed decreased in the sheltered waters of the Wash, dropped their mud and the level of this mud slowly rose until it was only covered at high tide. The rivers, too, flowing through, added their silt whenever they flooded. Thus to-day silt is found around the coast stretching inland for some ten to fifteen miles. Between these mud banks and the firm land was swamp, covered with reeds and shallow ponds, over which the rivers often overflowed. The reeds died and decayed, and others grew, so that a layer, varying in thickness from a few inches to many feet, of black, spongy, peaty earth was formed.

The fertility of the coastal silt was early realized and, before the time of the Romans, parts were certainly cultivated. The Romans continued this drainage, but after they left their work seems to have been allowed to go to ruin. The fenland still remained as the home of fish and waterfowl, but of few people, although, on some of the islands, for example, Ely and Wisbech (pronounced Wizbeech), there were settlements. Ely, which means eel district, was founded by monks, for here they hoped to be able to practise their religion in peace and security. It was not until the seventeenth century that reclamation was started on a large scale, and to-day the Fen country is the most fertile and most highly farmed land in England. Reclamation was not easy. The rivers have had to be em-



British Council

THE FENS (Lincolnshire). Note that the road has been built on an embankment beside the river (the Welland)

banked, for they are above the level of the surrounding land, and water from drainage ditches is pumped into them. This was done at first by pumps worked by hand or by horse, then windmills were used, as in the Netherlands, but now steam and petrol pumps do the work. The rivers were not straight, and great drainage canals were built to take the water quickly to the sea. The rivers have sluice gates at their mouths, which will only open outwards, that is, when the tide comes in the gates shut and prevent the sea water from coming up the river. There are still difficulties in the Fens, especially if the rivers happen to be high at a time when there are spring tides and a strong east wind.

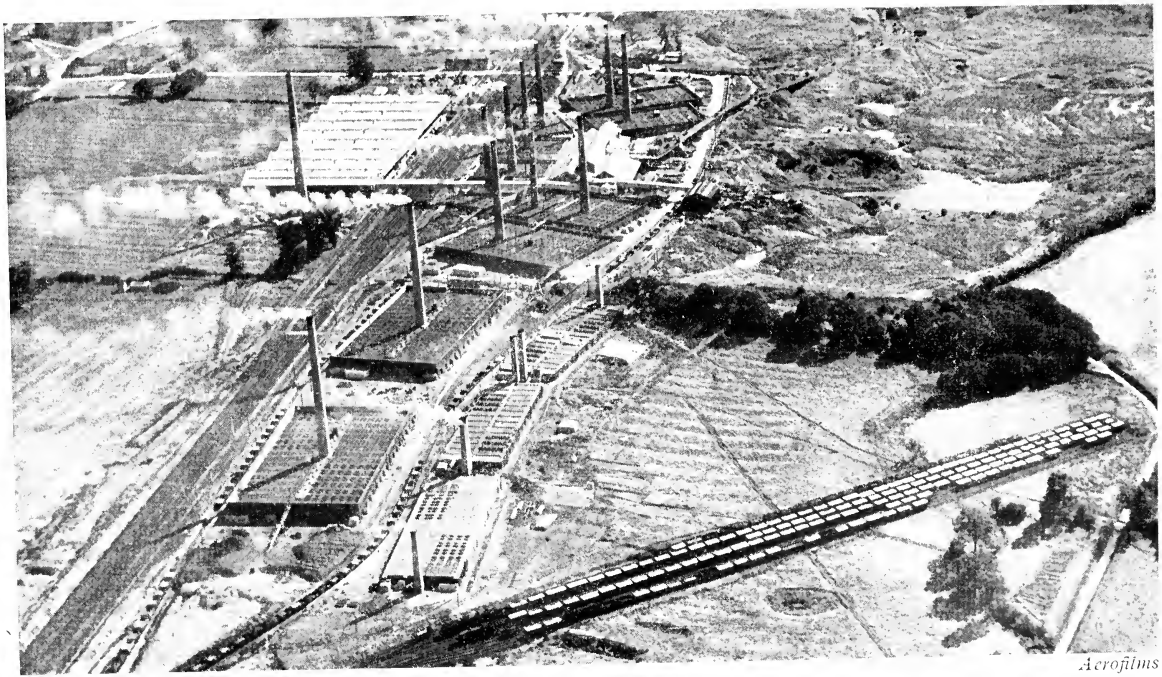
To a visitor from another part of Britain the Fenland scene is a curious one. Fields are divided not by hedges or walls, but by drainage canals, and the roads, often running alongside the embankment of a drainage canal, may go straight for miles on end. The land is very flat and, to many, uninteresting, but, on a summer afternoon, the Fens, because of the unbroken sky line, give magnificent cloud effects. Villages are usually on patches of higher ground, and thus some views of the Fens suggest a curiously uninhabited countryside, whereas elsewhere there may be a long line of villages. The cropping of the land is unusual and the average farmer is really more a large-scale market gardener than a farmer. Potatoes cover about one-third of all the land, and although more important on the silt than in the fen, they are everywhere a major crop. Other crops are wheat, sugar-beet, and vegetables. The drainage canals are often used to transport the sugar-beet to the factories. Some districts of lighter soils, usually in the silt, are famous for fruit, as at Wisbech, and bulbs, as at Spalding. Crop yields are high on the fertile land of the Fens; fifty bushels of wheat to the acre is not uncommon, while the average for the whole country is about thirty-five. About four-fifths of the land is arable, and live-stock are comparatively unimportant. Pigs are kept, which can be fed

on low-quality potatoes or grain, and there are some cattle. These are either grazed on the small area of pasture or fattened in yards: their manure is of great value.

Note the line of towns, Lincoln, Peterborough, Huntingdon, and Cambridge, where rivers entered the former marshland. Peterborough, like many towns in the clay vale, is famous for bricks, and Fletton, near by, has given its name to a variety of brick.

Breckland. Breckland, on the borders of Norfolk and Suffolk, is of poor sandy soil inhabited, until recently, principally by rabbits. There is good pheasant and partridge shooting, and sporting rents are often higher than agricultural rents! Much of Breckland has now been planted with conifers under a Government afforestation scheme: it is the largest forest in England.

The Broads. The Broads are shallow lakes near the mouth of the Yare. In Roman times what is now Broadland formed a wide bay, but the movement of material from farther north by the tide gradually formed a spit of shingle and sand between the open sea and the bay. This embankment was sufficiently firm for the foundation of Yarmouth in the eleventh century (see diagram 47). Behind this barrier rivers dropped their silt. Much of this marshland has been reclaimed, but the deeper hollows of the original bay are the reed-bordered broads, a popular holiday resort. This area then is an example of land extension in historical times, but on the Norfolk coast to the north of the Broads the opposite, the loss of land to the sea, has happened. Here six coastal villages have been lost since the Norman Conquest and, since Roman times, the coastline has moved inwards some two to three miles. It is not possible in a book of this size to mention even the major changes in the coast-line of the British Isles in historical time: it must be realized that what has been described is not an isolated case.



Aerofilms

BRICK WORKS (Bedfordshire). Note excavations made for clay (on right), and that the works have excellent communications by road and rail

Question 3. The main recent changes in the coast-line have been on the east and south-east coasts of England. Explain.

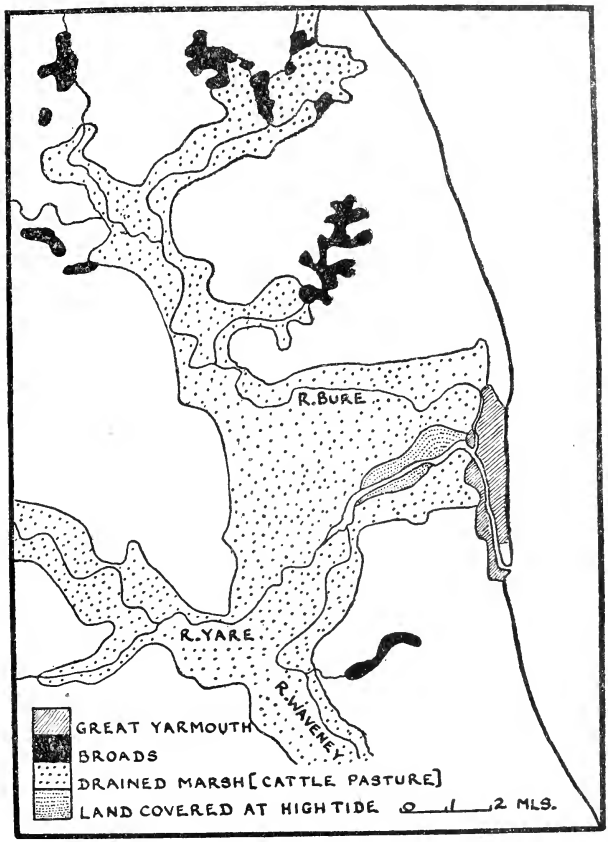


DIAGRAM 47. MAP SHOWING (i) THE SITE OF GREAT YARMOUTH, (ii) AN EARLIER BAY NOW COVERED BY THE BROADS AND DRAINED MARSHLAND

The reclaimed marshland of Yare, Bure, and Waveney, and parts of Leicestershire, Rutland, and Northamptonshire, particularly along the low-lying valleys of the Welland

and Nen, are good 'fattening' pastures. Both areas are shown on the sketch-map, and part of the East Anglian district is shown in greater detail in the map of Broadland (diagram 47). In the latter area the cattle pasture, with but a few scattered houses, forms a striking contrast to the surrounding land, which is almost entirely arable. In both areas the usual practice is to buy bullocks, commonly Shorthorns, in the spring, often from Wales or Ireland, fatten them during the summer, and sell them off in the autumn. The area of Welland and Nen is the most important 'fattening' region in the country. The farmers, with little to do in the winter, often hunt, for this well-known grassland is the most famous hunting country, the home of the Quorn and the Pytchley (first *y* pronounced as in 'cycle').

Question 4. Northampton, Kettering, and smaller towns near by form the most famous district in England for boot and shoe manufacture. Suggest a reason for the growth of the industry here.

The chief town in East Anglia is Norwich, at the junction of Yare and Wensum, and the city can be reached by small sea-going ships Norwich, at one time the greatest manufacturing town in the whole country, was important for woollens, for the district produced, and still produces, wool and, even to-day, there is a large sheep market. The word worsted, applied to cloth made from long-staple wool, is derived from the name of a small town to the north-east of Norwich.

Question 5. Why did Norwich lose its woollen industry? [Remember that the first power-driven spinning and weaving machines were driven by water-mills in fast-running streams, and that the steam engine came later.]

Question 6. Among the present industries of Norwich are sugar-beet refining, mustard, starch, beer, cider,

malt vinegar, agricultural implements. What common factor can be noticed about these? [There is also an important boot and shoe industry: this was introduced into the city when the wool trade was lost.]

Agricultural machinery was the basis of industry at Lincoln and Ipswich, but to-day it is, for example, the manufacture of excavating machinery and steam rollers that is important at Lincoln, and of cranes at Ipswich. It is to be noted that Lincoln, a gap town in the limestone Lincoln Edge, was never important for woollens, for the water is hard.

Ports in this region, King's Lynn, Yarmouth, Lowestoft, Ipswich, Harwich, are small. The trade of King's Lynn and Ipswich is mainly local, but Harwich must be considered as an outport of London. From it go the ferries to the Netherlands (Hook of Holland) and to Denmark (Esbjerg), and its imports include dairy produce, eggs, and bacon, destined for the London market.

Question 7. (i) For what are Yarmouth and Lowestoft famous?

(ii) 'A good October makes Yarmouth prosperous,' said to the author by a Yarmouth shopkeeper. Explain what the shopkeeper meant. (Chapter I.)

Question 8. Of the two great university towns, Oxford and Cambridge, the latter is shown on the sketch-map and Oxford is just outside it to the south-west. Why should the old universities have been in the southern part of England?

Question 9. Draw a sketch-map of Lincolnshire, dividing it into main regions. Note that there are two ridges, those of the Lincoln Edge and Lincoln Wolds. The clay vale between passes southwards into the Fens. On the east coast is some valuable grazing land, the so-called Lincolnshire 'Marsh.' In the

extreme north-west of the county, that is, between Don and Trent, is an area known as the Isle of Axholme. This is drained marshland, and its fertile soil gives heavy crops of potatoes, sugar-beet, wheat, and vegetables. Here is found the practice, mentioned in the discussion of the Vale of York, of trapping the flood tide of the river, in this case the Trent, behind dykes and allowing the mud to settle.

Examination Questions

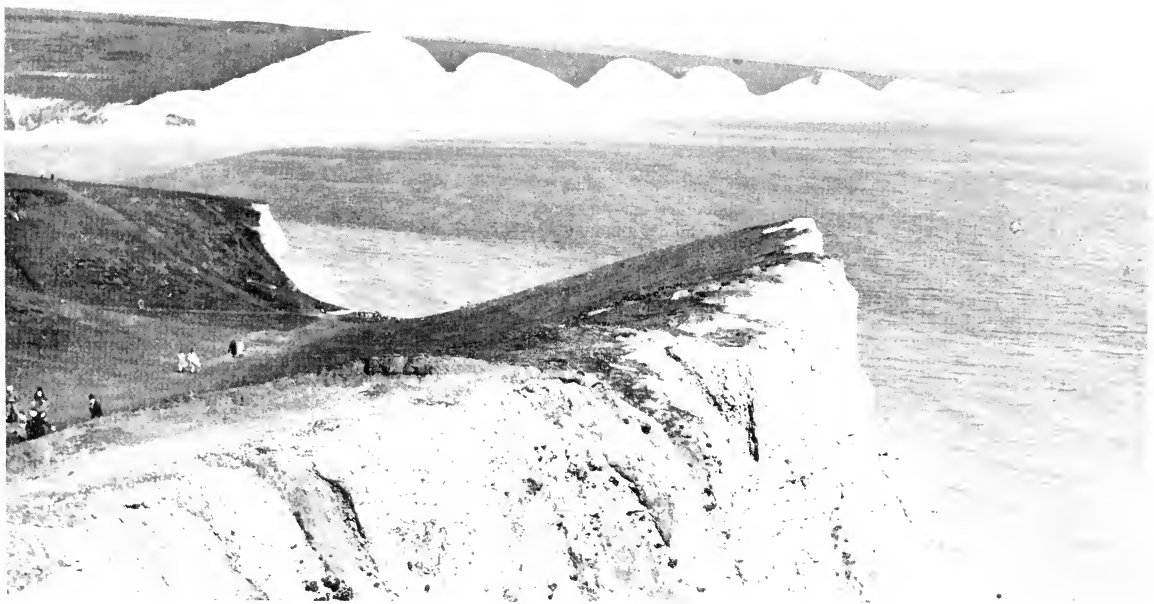
1. Compare and contrast the farming activities of south-west Ireland with those of East Anglia. (London.)

2. Describe the characteristic type of farming in each of the counties, Aberdeenshire, Cheshire, Suffolk, and account for the differences. (Cambridge.)

3. By reference to contrasted geographical conditions account for the more even distribution of population in East Anglia than in Wales. (London.)

4. State briefly the relief features, the types of farming, and the industrial activities occurring along a line drawn from Liverpool to Lincoln. (London.)

5. Contrast the geographical conditions which are favourable to (*a*) wheat growing, (*b*) pastoral activities. Illustrate your answer by reference to one area of each type in the British Isles. (London.)



Southern Railway

THE SEVEN SISTERS, SEAFORD, SUSSEX. The South Downs reach the sea as steep, chalk cliffs: Beachy Head is on the extreme right

CHAPTER XII

SOUTH-EASTERN ENGLAND

SOUTH-EASTERN England was, in the past, covered with a great thickness of chalk, which was later forced up into an arch during the Alpine period of mountain building. The effects of the weather were most severe on the highest parts,

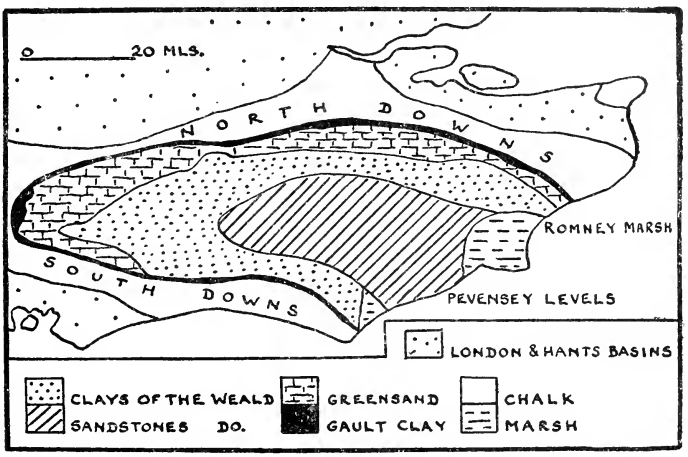


DIAGRAM 48. GEOLOGICAL MAP OF SOUTH-EASTERN ENGLAND

which were probably some three thousand feet above sea level, and so the top of the arch has been worn away to reveal the layers underneath. The present structure shown in diagrams 48 and 49 is a heart of Wealden sandstone with horse-shoe-shaped areas which partially surround it. The Greensand is insignificant south of the Wealden sandstone, and has been ignored on the map. The chalk comes to the sea in steep white cliffs around Dover and Beachy Head, although, in the past, the arch was continued eastwards to the Continent.

Question 1. What evidence is there of this eastward continuation?

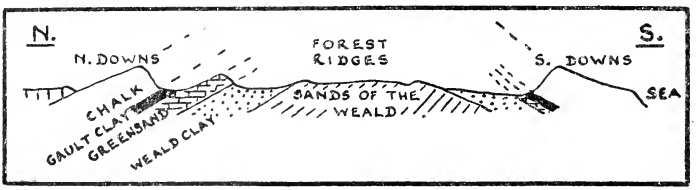


DIAGRAM 49. SECTION FROM NORTH TO SOUTH ACROSS SOUTH-EASTERN ENGLAND

The sketch-map, diagram 50, shows the height of ground, and thus is not quite the same as the geological sketch. It will be seen that the North and South Downs are of chalk,

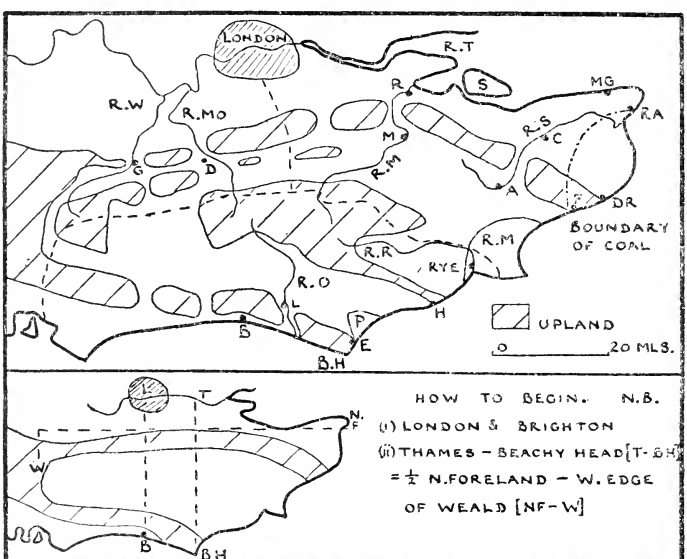


DIAGRAM 50. SKETCH-MAP: SOUTH-EASTERN ENGLAND

but a part only of the Greensand and Wealden sands form high land. The scarps of the North and South Downs face inward and, although these hills are low, the scarps are

often some four hundred feet high and are steep (see diagram 51, map 2).

A discussion of the farming is best done according to these main geological divisions. The Wealden sandstone is agriculturally poor, except in Kent, where hops and fruit are grown. The higher parts, often called the Forest Ridges, are mainly under grass, with sheep and cattle and poultry farms, but there are many areas of woodland and heathland, for example, Ashdown Forest, and these, with well-drained soil, open views, and cheap land, have become favourite residential districts.

> *Question 2.* The Weald clay is heavy and is mainly under grass, with sheep and cattle, although some lighter soils are ploughed for mixed farming. Why have the heavy soils been kept as grass?

The Greensand on the west is high, the sands coarse, and the soils poor, so that the area is open heathland or pine forest. At Leith Hill it reaches nearly a thousand feet, the highest point of south-eastern England. To the east, mainly in Kent, where the land is lower and the sands finer, the ground is highly cultivated. Around Maidstone and in the Medway valley generally, fruit and hops are important, the steep scarp face of the Greensand with a southerly exposure being particularly good for fruit. A point about the siting of orchards which is not generally realized may be mentioned here. Late frosts which may kill the blossom are the fruit-grower's nightmare, and an orchard on a hill-slope often avoids these. Cold air at night, being heavy, will flow down the hill, and settle in the valley, so the valley bottom is colder than the hill-slope. Apples, pears, plums, and soft fruit are the main crops, and there are now canning factories at Maidstone and other towns in the neighbourhood.

The Gault clay at the foot of the downs is hardly ever under the plough, but where it joins the chalk or the Greensand the mixed soils give rise to a narrow strip of arable land.

On the South Downs, the 'whale-backed' downs, as Kipling called them from their great smooth humps, sheep feed on the coarse, crisp grass. The lower slopes are cultivated often on the 'sheep with corn' system described in Chapter IV, although, as was mentioned there, to-day dairy-farming also is carried on if water is available. The North Downs are usually not so open as the South, for there is often a capping of clay with flints, which is usually under grass or woodland.

The area in Kent between the North Downs and the Thames estuary, although sometimes included in the London basin, will be considered now. Here are rich loamy soils given over to fruit, cherry, apple, pear, raspberry, gooseberry, strawberry, and, in addition, hops. Kent is often called the 'Garden of England,' and the rich cultivation of this area and of the Medway valley gives it a right to the title. The author Camden, writing on Britain at the end of the sixteenth century, was able to say of Kent: 'Pomis ad miraculum abundans nec non cerasis.' More than two-thirds of all the hops of Great Britain are grown in mid Kent and east Sussex, and about one-quarter of the area in Britain devoted to fruit is found in this region. A hop garden is a strange sight to a visitor. Tall poles are placed in lines across the fields, and up these the plants climb. Wires are fixed between the poles, and the plants twine round these as well. Not only do hops require a good deal of attention during their growing season, but much extra labour is required at harvest, and thousands of Londoners, principally from the East End, go hop-picking—a combination of holiday and work. It is clear that, with all the work necessary for the cultivation of hops, the crop is not worth growing unless conditions are suitable. This is the reason why the distribution of hops is so limited in the British Isles. In the hop country oast-houses, used for drying the hops before they are sold to the brewers, are a common sight.

Keystone Press

ORCHARDS IN KENT. The importance of hops and fruit in parts of Kent is mentioned in the text. Oast-houses, where hops are dried before being sent to the brewer, are seen in the foreground. The picture, taken in spring, shows a countryside full of cherry and plum blossom

Question 3, Where is the 'Garden of Scotland'? (Chapter V.)

Question 4. Which is the other important area in England for hops? (Chapter IX.)

Diagram 48 shades Romney Marsh and the Pevensey Levels as marsh, but this name is misleading. The greater part of both is below the level of the highest tides, but the areas have been reclaimed from the sea, from which they are now protected by a sea wall. Both are well drained, and thus the name marsh is really a misnomer. They are mainly under grass but, strangely enough, Romney is a sheep-rearing area, whereas Pevensey rears mainly beef cattle. Why Romney should be better for feeding sheep and Pevensey better for grazing cattle seems to be a mystery. Romney Marsh is somewhat bleak in the winter, and it is usual for the lambs to be sent to inland farms during the colder months. It will have been noticed that south-east England, that is, the Downs and the land between, is essentially a grassland area with dairying and sheep rearing as the two main occupations. There are, naturally, a number of general live-stock markets, for example, at Guildford, Ashford, and Lewes. Rye is noted for its sheep market, and Ashford and other towns for their sheep fairs.

Question 5. South-east England has many cement works. Why? [The most famous area for cement is along the lower Medway. Here, in fact, is to be found the largest industrial population centre of the whole of south-east England. Rochester has been marked on the sketch-map, and an atlas will show Gillingham and Chatham (a naval town) near by. Paper making, an old Kentish industry, is carried on there, using imported wood pulp. Steam rollers and tractors are made at Rochester, in the works founded by their inventor.]

Iron smelting has been important in south-east England, based on ironstone in the Wealden clay of Sussex and local charcoal, but the industry died with the introduction of coke smelting, and with the exhaustion of the forests in the late eighteenth century. Now only place-names such as Cinder Hill, Furnace Farm, or Forge attest to its former greatness. The railings round St. Paul's Cathedral are made of Sussex iron. Coal is mined in the Dover area, and there is iron ore in some of the beds above the coal, but, as has been said earlier, the opening of these mines is but recent, and no industrial area has as yet arisen. The bulk of the coal is used by the Southern Railway, and there is an overhead cable for its easy transport from the pithead to Dover.

It is strange that the name Weald (=forest) has persisted in this region, for most of England was, at one time, forested, and not only this area. The explanation is probably this. South-east England has long been the home of man, and it has been invaded not only by Romans, Saxons, and Normans, but even earlier by Stone Age men when it was joined to the Continent, for the break did not occur until about 5000 B.C. The area to the east, where Saxons conquered the Cantii, became Kent, Sussex was held by the south Saxons, while a branch of the middle Saxons from Middlesex established themselves in Surrey. These three groups of agricultural people were separated by the forest of the infertile central sandstone; the boundaries were not lines, but an area, and the name 'weald' for the area has persisted. The sketch-map shows that the modern boundary *lines* meet in the Wealden sand.

In the days of the chalk dome rivers flowed north and south from the central water parting. Denudation was so slow that the rivers have kept their old courses, and broken through the chalk rim. Towns are found to north and south of these gaps, where the way through the gap meets the east and west routes along the foot of the chalk. As has

been said earlier, the hills are not high, but it is the steep scarp slopes which make communication difficult. Some of these gap towns are shown on the map. Diagram 51 shows

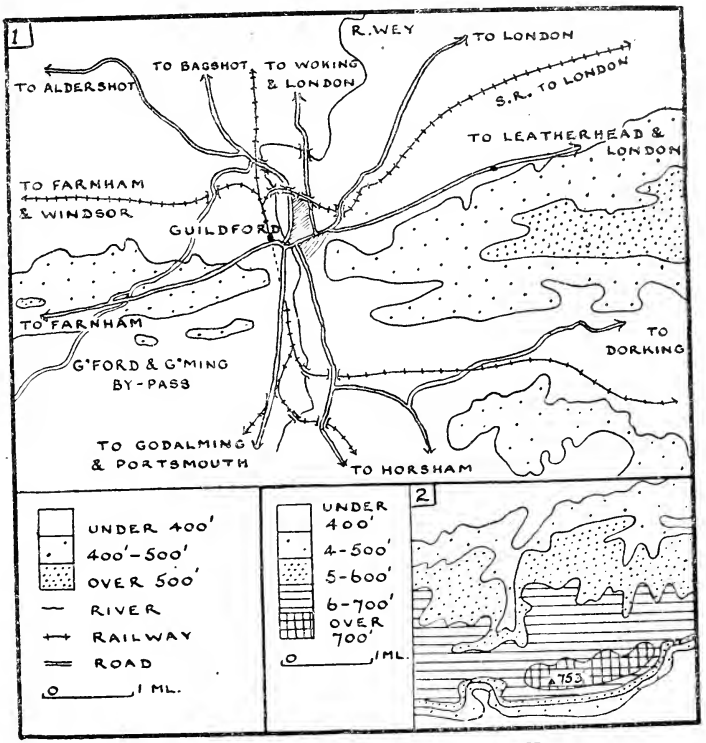


DIAGRAM 51. 1. GUILDFORD AS A GAP TOWN

(Note the Guildford and Goldaming by-pass that tunnels under the road from Guildford to Farnham along the Hog's Back)

2. A PORTION OF THE NORTH DOWNS BETWEEN GUILDFORD AND DORKING TO SHOW THE STEEP SOUTHERN SCARP FACE

the road and rail routes converging on Guildford, where, because the chalk hills are here narrower, the two towns merge into one.

There is no first-class harbour in south-eastern England and, in the days of sailing ships, difficulties of wind and

tide, which were considerable because the Channel narrows, caused many ports to be used. The Romans used Dover and Richborough, the Saxons the Cinque Ports, originally Sandwich, Dover, Hythe, Romney, and Hastings, although others were added later. The many ports and the uncertainty of the point of landing on the English shore owing to difficulties of navigation does not mean that separate roads were made from each of these ports to London. Instead the roads from the ports in the vicinity of Dover converged on Canterbury, and there was then one road on to London. This explains the early importance of the town (Canterbury=burg of Cantware or people of Kent). Augustine chose Canterbury as the centre from which to begin the conversion of the country to Christianity, and to-day the Archbishop of Canterbury is the Primate of All England. Dover, Folkestone, and Newhaven are the modern ferry ports with services to the Continent.

Question 6. The route London–Newhaven–Dieppe–Paris is shorter and cheaper than London–Dover–Calais–Paris, but the latter is the quicker. Explain.

Question 7. Many people in south-eastern England work in London. The principal areas of new growth have been the chalk hills, the higher Greensand, and parts of the Forest Ridges. Has this new building development affected to any extent the area of good agricultural land?

Question 8. There are many seaside resorts in south-eastern England, for example, Margate, Ramsgate, Folkestone, Hastings, Eastbourne, Brighton, and Hove. Why are there so many?

An atlas will show the main railway routes of this region, and note should be taken of three: London–Brighton, London–Portsmouth, and London–Dover.

Examination Questions

1. Draw a sketch-map to show how routes are related to relief in either the Southern Uplands of Scotland or south-east England (Kent, Surrey, and Sussex). (Cambridge.)

2. In regard to the area covered by the counties of Kent and Sussex: (*a*) describe and account for the characteristic farming activities, (*b*) suggest reasons for the comparatively large number of towns on its coasts. (Cambridge.)

3. What geographical factors have helped to make:
(*a*) Northern Ireland noted for linen manufacturing?
(*b*) The South Downs noted for its sheep rearing?
(*c*) North Wales noted for its holiday resorts? (Oxford.)

4. Draw a sketch-map of the country south of a line drawn roughly east from London and east of a line drawn roughly south from London. Indicate the relief; indicate and name three rivers, three inland towns, one port, and one seaside resort. (London.)

5. Select two of the regions: the Midland valley of Scotland and its immediate boundaries, the Fens, the Lake District, the Weald and the hills surrounding it. Describe the relief and the drainage of the regions you select, and point out how the drainage is related to the relief. For each of the two regions mention two distinct types of farming which are important. (C.W.B.)

6. Draw a large sketch-map of East Anglia and south-east England (east of a line from the Wash through London to Brighton), indicating and naming:
(*a*) The general relief features.
(*b*) Any three rivers.
(*c*) The Chalk Ridges and the Norfolk Broads.
(*d*) One coal-mining district, one important fishing port, and the chief fruit-growing area.
(*e*) Norwich, Ipswich, Maidstone, and Dover.
(London.)

CHAPTER XIII

THE HAMPSHIRE BASIN

THE Hampshire basin (diagram 52) is a lowland of clays and sands, surrounded by a rim of chalk hills. To the east, north, and west the chalk is continuous, but to the south it is

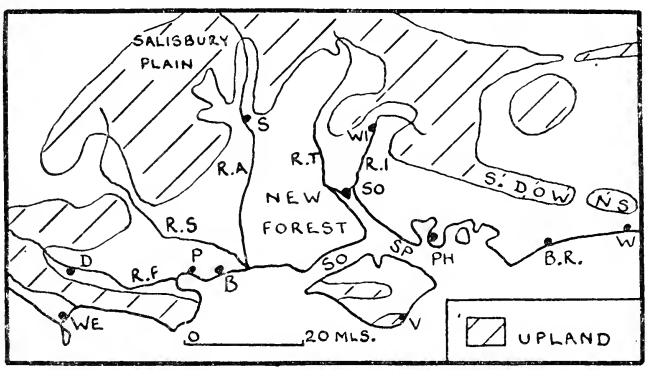


DIAGRAM 52. SKETCH-MAP: THE HAMPSHIRE BASIN

broken by the Solent and Spithead, although the chalk may be traced through the Isle of Wight, and the Needles to the west of the island are chalk stacks.

The coastal areas, including the Isle of Wight, are among the sunniest in the British Isles, with some 1,700 to 1,800 hours of sunshine per year, and seaside resorts, for example, Weymouth, Bournemouth, Bognor Regis, and Worthing, facing south to the sun and the sea, line the coasts.

Question 1. If a town, for example, Ventnor (Isle of Wight), not only faces south, but has hills behind, the winter climate is mild. What is the advantage to the town of the hills?

These towns are not only holiday resorts, for they have

attracted many retired people, who have made them their homes; Bournemouth, although without industries, has over 120,000 people.

The type of farming commonly practised in chalk areas has been described in Chapter IV, but over some of the barren part of this chalk upland, as on Salisbury Plain, wide spaces are used as military training grounds. The clay areas of the basin are usually of fertile soil used for mixed farming and fruit, while the sands are often covered with heathland or woodland, for example, the New Forest. In the sunny sheltered strip in Sussex between the South Downs and the sea, market gardening is important, and the tomatoes of Worthing are particularly well known.

The Hampshire basin is without coal, industry is usually unimportant, and the inland towns are market centres. Winchester, Salisbury, and Dorchester are, in addition, county towns, for, although this region is called the Hampshire basin, it includes parts of Sussex, Wiltshire, and Dorset. But two towns, Portsmouth and Southampton, have not merely a local, but a national importance. Diagram 53 shows the circular shape of Portsmouth harbour, with its narrow entrance. Large enough to hold a fleet, with an easily guarded entrance, with long-range guns on Ports Down behind, and with a good roadstead in Spithead, it represents an ideal naval base. Many 'wooden walls' were built in Southampton Water from New Forest oak; three of Nelson's ships at Trafalgar were built at Beaulieu (pronounced to rhyme with 'duly'). Southampton is a port of recent growth, for less than a century ago the town was a small watering place. The enterprise of the Southern Railway has had much to do with its modern importance, for the railway company has been responsible for dredging, land reclamation for new docks and warehouses, and the provision of up-to-date port facilities, including the largest graving dock in the world (see diagram 53). In addition a fast train service to London, which saves twelve hours over

the sea journey, has made the port the premier passenger port of the country, with about one-third of the total traffic. In fact, Southampton must be considered as an outport of London, for about one-half of its imports go there. The hinterland of Southampton, that is, the area served by the

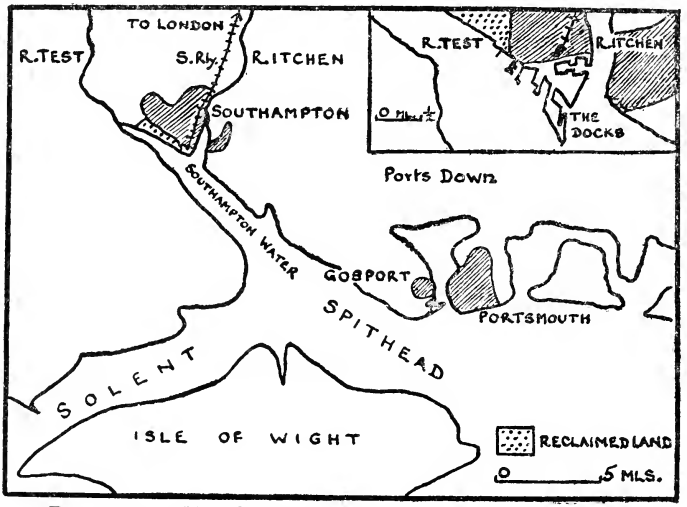
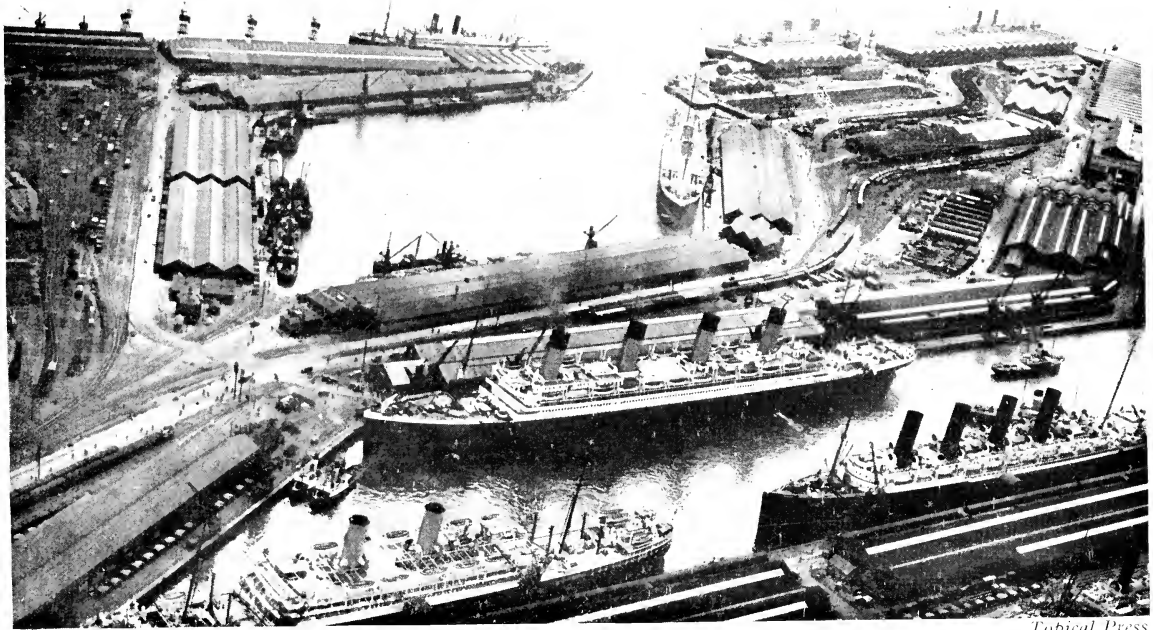


DIAGRAM 53. THE SITES OF SOUTHAMPTON AND PORTSMOUTH
(Inset shows Southampton docks)

port, is nearly the whole country, and includes not only northern England, but even Scotland. Its trade is world-wide, but is principally with New Zealand and Australia (meat and butter), South Africa (wool, hides, and fruit), South America (meat), and north-west North America (fruit, salmon, and timber). Southampton has some manufactures in engineering, aircraft, and tobacco. One further point may be added. Ships going to or coming from Poland, Germany, Holland, and Belgium pass through the English Channel, and many of them, particularly the passenger liners, call at Southampton, not only adding to the importance of the port, but providing Britain with a magnificent service.



Topical Press

SOUTHAMPTON DOCKS. The photograph shows part of the spit of land between Test and Itchen. Note how railways run down to the water's edge

Question 2. It will have been noted above in the description of Southampton:

(*a*) That the twelve hours' saving of time on the journey to London has made the town a great *passenger* port.

(*b*) That the imports (one-half of which come to London) are mainly of perishable goods of high value compared with their bulk, e.g. meat, butter, fruit.

Comment on these two facts.

CHAPTER XIV

SOUTH-WESTERN ENGLAND

In the broad physical division of Great Britain made in Chapter I south-west England was included in the highland zone. Diagram 54 shows, however, that the peninsula is a

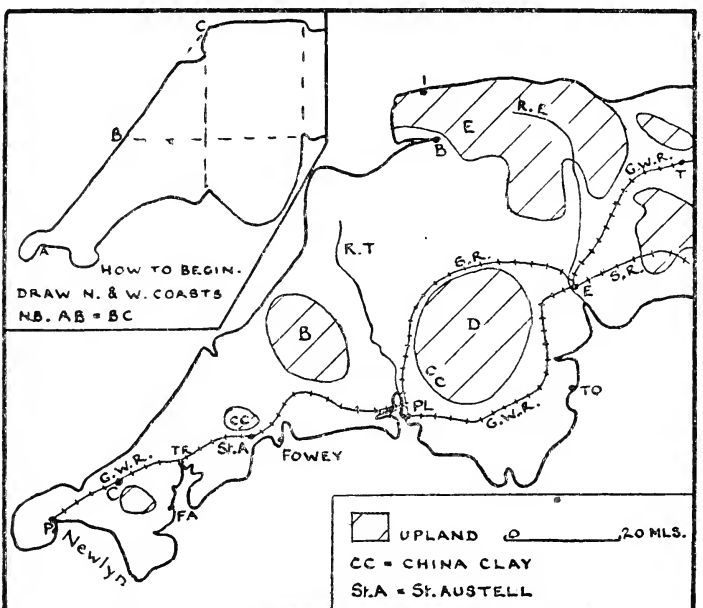


DIAGRAM 54. SKETCH-MAP: SOUTH-WESTERN ENGLAND

region of upland bosses and intervening valleys. These highlands, usually of granite, although Exmoor is sandstone, made invasion difficult; Roman remains are few west of the Exe, and the Saxons did not cross the Tamar. Although this peninsula has not a special name like Wales or Scotland, the people are allied to the Welsh and the Bretons, and the

Cornish language was in common use until the eighteenth century. Cornwall is often called the land of *tre* and *pol* and *pen* (*tre*=hamlet, *pol*=pool or stream, *pen*=headland or summit), because these words of the Cornish language are so often found in place-names. The following place-names are all within a few miles of Land's End: Tresidder, Trevedran, Trevorgan, Trevear, Trevadra; Poldhu, Polbream, Poltesco, Polcornick, Polurrian; Penzance, Pendeen, Pennance, Penmenor, Pen Ennys. Even to-day a Cornishman will still talk of going to England when he crosses the Tamar.

The upland areas are heather-covered, rolling moorland, with some bog, rising to some two thousand feet. The granite moorlands, particularly Dartmoor, are sometimes crowned with 'tors,' fantastically shaped piles of granite blocks, often weighing several tons. Farms in the valleys of the moorland are concerned mainly with sheep, although some cattle are reared and oats, turnips, and potatoes are grown. Sheep and cattle from lowland farms are grazed in summer on the wilder unenclosed portions of the moor.

Question 1. What are the advantages of Dartmoor as a site for a prison?

Although the higher lands are bleak in winter, elsewhere, particularly on the sheltered south coast, winters are the mildest in Britain. It is possible to subdivide these lowlands into many minor regions, but it is broadly true to say that grass is the best crop, and the rearing of cattle the main thought of the farmer. It is not easy to state simply yet accurately the areas in which beef or dairy cattle predominate, but beef cattle are important in Cornwall and the plain of Devon, i.e. between Exmoor and Dartmoor, while dairy cattle are numerous south of Dartmoor. To-day the milk is seldom made into butter on the farm, but is sold to local creameries; in summer much clotted cream, so popular with tourists in both Devon and Cornwall, is made.

Particularly in Devon many farms have a few acres of cider orchards, although here again the making of cider on the farm is decreasing, and the apples are usually sold to big companies, who make the cider in large factories.

Question 2. What are the advantages of mild winters in the rearing of cattle? (Page 83.)

Question 3. Pig-breeding is common in south-west England. Why? (Page 66.)

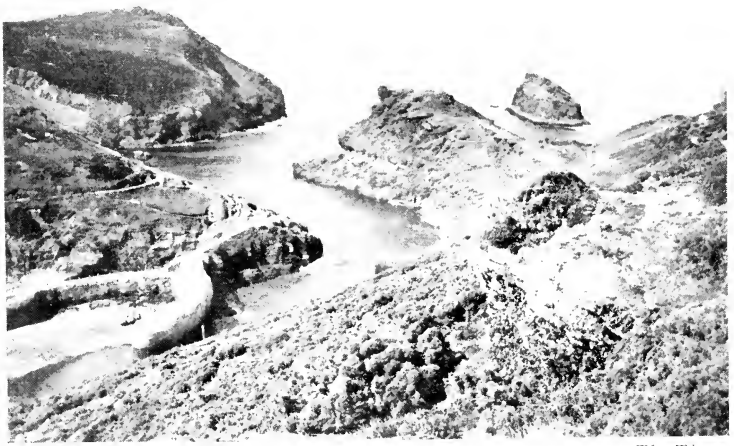
Question 4. In the extreme south-west, particularly in the Mount's Bay district, the production of early flowers (narcissi, daffodils) and vegetables (early potatoes, broccoli) is very important. What advantage has this area over the rest of England for these crops? [The Scilly Isles, lying nearly thirty miles to the west of Land's End, may be compared with the extreme south-west of Cornwall, except that flower growing is the main occupation, but for a few very early potatoes.]

In addition to the Mount's Bay district one other special area must be mentioned. This is the lower Tamar valley, where flowers, mainly narcissi, and fruit, particularly strawberries, raspberries, and black-currants, are grown.

South-west England was the home of the old sea-dog, who was trader, explorer, and pirate, for the coasts, particularly in the south, are indented and small fishing villages nestle in nearly every cove. Diagram 55 shows a typical drowned valley or 'ria' of this coast. The northern coast is wilder, less protected and, in some cases, with high unbroken cliffs as, for example, north of Exmoor, and fishing villages are scarcer. The fishing industry to-day, with Newlyn as the chief port, is small compared with that in the North Sea. Since the coming of the cheap motor car, fishing is often merely a side-line to the more profitable business of boarding the many tourists who crowd in summer into the picturesque villages.

British Council

DARTMOOR. The photograph shows a lonely road across the moor: Dartmoor ponies are seen in the foreground



The Times

BOSCASTLE, CORNWALL. A view of the steep rocky cliffs of Cornwall, and the entrance to a cove

Question 5. If a cove faces towards the south-west there is often no village. Why is this?

Question 6. There is a winter tourist industry in south-western England as well as a summer one. Why?

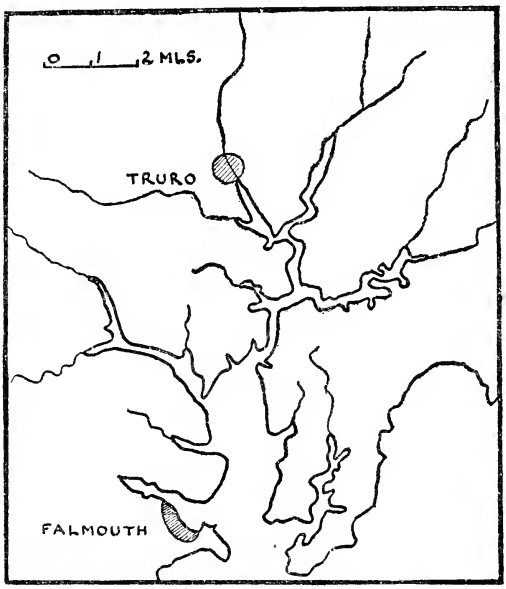


DIAGRAM 55. A DROWNED VALLEY (RIA)

The call of the sea is, however, still strong, and many young men find their way into the navy and merchant service. The tourist industry is important inland as well, for not only do the moorlands attract summer visitors, but also the charming Devonshire villages with their white-washed, thatched-roof cottages. Devon lanes are pretty, too, for they wind between high hedges which are often stone walls on which earth has been piled and shrubs planted, so that the stone is invisible beneath its covering of green.

It has been said earlier that the Cassiterides were perhaps this region, or the Scillies—certain it is that tin and copper

have been mined for centuries. Copper is no longer mined, and the tin industry is moribund, for, with its deep mines of 2,000–3,000 ft., it cannot compete against the more easily obtained tin of Malaya. The mines have a short lease of life when the world price of tin is high, and then close down when the value falls. The chief mines are around Camborne and Redruth, and there is still a school of mining; Cornish-trained mining engineers are found all over the world. Again, in these small towns are to be found the offices of great mining companies operating perhaps for tin in Malaya or for gold in West Australia. In parenthesis, it may be noted how inaccurate to-day is the old county toast in Cornwall: 'Fish, tin, copper.' Kaolin or china clay is the only important mineral obtained to-day, and diagram 54 shows the principal areas; the most productive is that behind St. Austell. The clay is chemically altered granite, and is so soft that it can be washed down the sides of the quarries with hoses into tanks, where the china clay is allowed to settle. The heaps of waste material near the pits, looking like pyramids, give a strange appearance to the bare moorlands. Kaolin is valuable, not only for pottery, but as a filling for paper, and to give weight and finish to cotton goods. It is usually sent to other parts of England by coasting steamer; Fowey (pronounced Foy) is an important port in this trade, others are Falmouth and Plymouth.

Question 7. State the name of one part of England to which kaolin is sent. (Chapter VIII.)

With coal almost absent the Industrial Revolution had little effect on the distribution of population in the south-west, and industry is unimportant. The once famous woollen manufacture is to-day negligible, and Devon and Cornwall contain but little more than a million people. There are few large towns. Exeter has a population of over 200,000, but the largest town in Cornwall, Camborne, has but 14,000 people. Exeter was a small port and the lowest

bridge point of the Exe; it is still a great market town and a cathedral city. Plymouth has a good harbour, and is a local port, but its use as a port of call for liners has declined in favour of Southampton. Adjoining Plymouth is the naval base of Devonport. The tourist industry is the cause of the growth of Exmouth, Torquay, Ilfracombe, and many others.

Question 8. Seaside resorts on the south have attracted many retired people. What are the attractions?

Two railways serve the area, and the main lines have been shown. The G.W.R. runs from Taunton to Exeter, then skirts south round Dartmoor to Plymouth and Penzance; while the S.R., also serving Exeter and Plymouth, goes north round Dartmoor. The S.R. serves north Devon.

Examination Questions

1. Draw a sketch-map of the south-western peninsula of England (west of Exeter), and:

(*a*) Show and name three areas of upland.

(*b*) Indicate by a dot and name *one* important port and two seaside resorts.

(*c*) Indicate by shading *one* area of china clay production, and mark the port whence the clay is exported.

(*d*) Show the main railway route from Exeter to Falmouth, and that from Exeter to Barnstaple. (London.)

2. Account for the differences shown by the following information:

	Average density of pop. per sq. mile
(*a*) North-east England (Northumberland and Durham)	753
(*b*) South-west England (Cornwall and Devon)	266
(*c*) Central Wales (Brecknock, Montgomery, and Radnor)	64

(Cambridge.)

3. Give a concise and orderly geographical account of either Devon and Cornwall or Northumberland and Durham. Illustrate your answer by a large sketch-map showing the main relief features, lines of communication, location of major resources, and chief towns. (London.)

4. Select two of the following areas: the Potteries, Cornwall, the Lanarkshire coal-field, Ulster. Describe the activities of the people and say why those activities are carried on in the areas selected. (Oxford.)

CHAPTER XV

SOMERSET: BRISTOL

THE area to be discussed, diagram 56, is the isthmus east of the south-western peninsula which has just been described,

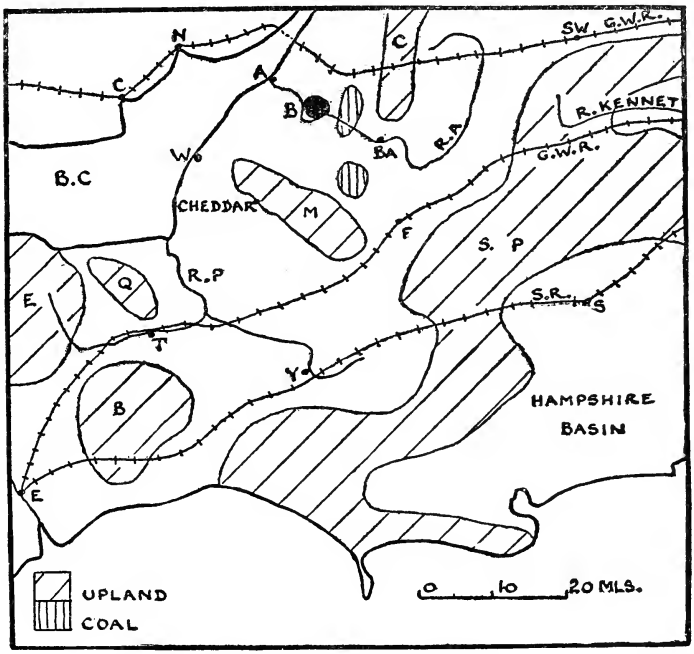


DIAGRAM 56. SKETCH-MAP: SOMERSET

but outside the chalk-girdled Hampshire basin. The lower Parret, sometimes called the Bridgwater Flats, is low-lying marshy alluvium, and careful drainage is necessary. This is one of the areas of Britain where it is possible to fatten cattle on grass alone, but this has been supplanted to some

extent by the rearing of dairy cattle for milk and cheese. East of the Bridgwater Flats is the well-known cheese-making area: Cheddar has given its name to a variety of cheese, made in Gloucestershire and Wiltshire as well as in Somerset, and also imitated abroad, for a similar cheese, made in Canada, is sold in English shops as Canadian 'cheddar.' The Vale of Taunton contains some of the richest soil in the whole of England, and it is probably this fertile tract that has caused the name 'Smiling Somerset' to be given to the county. This is a region not only of dairy cattle, but also of market gardens and cider orchards. It is only to the east of Somerset, on the land sloping up to the hills, that arable farming is of any moment.

Question 1. A greater proportion of the milk produced in this area is sent away as milk than is the case in Devon or Cornwall. Why is this?

Question 2. Give the names of other areas in Great Britain famous for their 'fattening' pastures.

The Mendips show all the characteristics of poor limestone regions, caves, underground rivers, and steep-sided gorges, and they may be compared with the southern part of the Pennines. The best-known gorge is that of Cheddar and, in fact, the name probably means gorge or cave.

An atlas will show that the boundary of north-west Somerset is in Exmoor, which has already been described in the previous chapter.

The Somerset plain, especially in the higher eastern districts, is dotted with small market towns. Here and farther north, in the Cotswolds, was the seat of the once prosperous west of England woollen industry, for, unlike Lincolnshire and Northamptonshire mentioned earlier, there were here both wool and soft water. There are still some woollen goods made as, for example, at Frome (pronounced Froom).

The chief port is Bristol (=the site of the bridge), but the town, like others in western Great Britain, did not become great until after the discovery of America. Before this it had merely a small trade with Ireland. Once trade with America and Africa began Bristol had many advantages. Of the rivers flowing into the Bristol Channel the valley of the Bristol Avon offered the best route to the Thames basin, and thus to what was then the only important part of England. Its western position was of advantage in the days

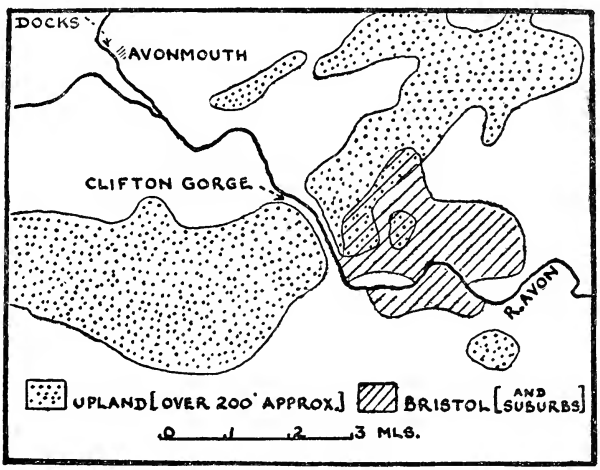


Diagram 57. The Site of Bristol

of sailing ships, for the difficult navigation of the English Channel was avoided. Diagram 57 shows that the city is some six miles from the sea, and the port probably grew up here because seaward of the Clifton gorge the land was low, liable to flooding, and more open to attack. The seventeenth century was the heyday of Bristol's prosperity, when the great triangular trade grew up, that is, trinkets to Africa, which were exchanged for slaves, slaves from West Africa to North America, and, the third leg of the triangle, from America to Bristol with sugar and tobacco.

Question 3. The Industrial Revolution and the coming of the steamship led to the decline of Bristol and the rise of Liverpool. Explain.

There was another cause of Bristol's decline, the increasing size of ships, for it is difficult to widen or to dredge the limestone Clifton gorge which lies to the seaward (diagram 57). This disadvantage has been overcome by building docks at Avonmouth. Trade to-day is still mainly with West Africa and America, for example, grain, timber, petroleum, oil-seeds and oil-nuts, bananas, cocoa.

Question 4. The small coal-field in the neighbourhood of Bristol has been shown (diagram 56), and the manufactures of the town include tobacco, cocoa and chocolate, soap. Suggest why these industries should have grown up.

Question 5. The export trade of Bristol is small. Why should this be so?

Bath, on the Avon, in a gap in the Cotswolds, is a town famous for its 'waters' and hot springs, and it was a health resort even as far back as the time of the Romans. The Roman baths, some of which still exist, have given the town its name.

There are holiday resorts on the Bristol Channel, and these are the nearest seaside towns to Birmingham: the largest, Weston-super-Mare, has been marked on the sketch-map.

Important main line railways cross the area: the G.W.R. (from Paddington), which tunnels under the Severn on its way to South Wales; and the G.W.R. (from Paddington) and the S.R. (from Waterloo), on their way to Exeter and the west.

Examination Questions

1. Draw sketch-maps to show the position of three of the following towns: Carlisle, Hull, Bristol, Stirling, Inverness. Add notes to explain the importance of each. (Oxford.)

2. Select three of the following ports: Leith, Southampton, Bristol, Cardiff. Describe the situation and explain the character of the trade of each port selected. Sketch-maps are expected. (Oxford.)

3. The chief animal industries in Britain comprise wool production, fattening for beef, and dairying. Name one area where each of these activities is carried on, and explain the geographical suitability of two of the areas for the industries carried on in them. (London.)

CHAPTER XVI

THE LONDON BASIN

THE sketch-map (diagram 58) shows not only the London basin, that is, the region inside the chalk of the Chilterns

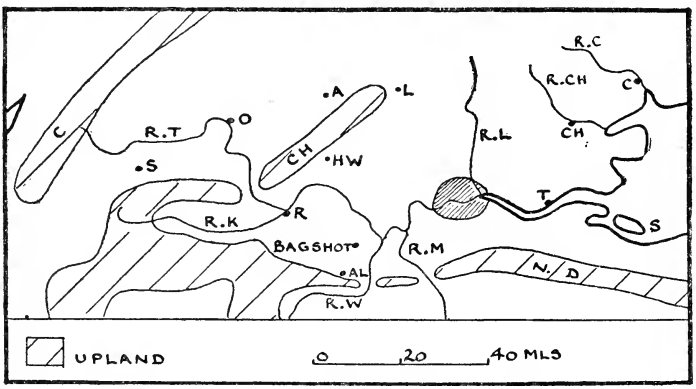


DIAGRAM 58. SKETCH-MAP: THE LONDON BASIN

and the North Downs, but also part of the clay vale between the chalk and limestone hills. Diagram 59 shows how the

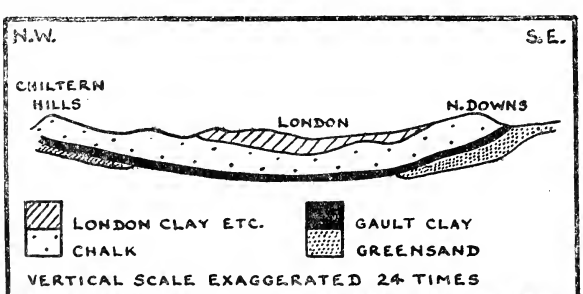


DIAGRAM 59. GEOLOGICAL SECTION FROM THE CHILTERN HILLS TO THE NORTH DOWNS

chalk of the Chilterns dips under the London area and reappears in the North Downs. The rocks of the London

basin are thus younger than the chalk, and of these the most widespread is the stiff, impermeable London clay. This is not the only rock, for there are glacial gravels and boulder clay, patches of sand, and also river gravels deposited when the Thames flowed at a higher level than it does now. The London basin may thus be subdivided into a number of minor regions, but it is sufficient here to consider how the land is used. There is a number of areas of poor soil, usually of sand or gravel, such as Hampstead Heath, Bagshot Heath, Blackheath, and Wimbledon and Clapham commons. These have always been agriculturally unproductive, and those in London now provide very welcome open spaces. Bagshot has been marked on the map, and the heath around it is the only one which need be noted. The military centre of Aldershot, with its nearby training grounds, is on these infertile Bagshot sands. There are some tracts of fertile soil which should be shown on the map, the Lea valley for market gardening and with many glasshouses, and the Thames valley, particularly the northern side in Middlesex, with market gardening and fruit. Most of the remainder of the London basin is clay, mainly under permanent grass, and supplying milk to London. The very fertile area in Kent, north of the North Downs, is often included in the London basin, but for convenience was dealt with in Chapter XII, on south-eastern England.

In Chapter XI it was pointed out that the clay vale in Huntingdonshire, south Cambridgeshire, and Bedfordshire was covered with chalky boulder clay; here, farther south, there is no glacial deposit, and thus Oxfordshire and north Buckinghamshire are mainly under grass, and supply milk to London. The vale of Aylesbury is especially famous for milk.

Diagram 60 shows the railway routes through the Chilterns: it shows a number of small gap-towns and the manner in which the railways have used the easiest routes through the hills.

Although most of this chapter will obviously be a discussion on the importance of London, there are some other towns of which mention must be made. Luton is famous for motor cars and hat-shapes. The latter industry is a

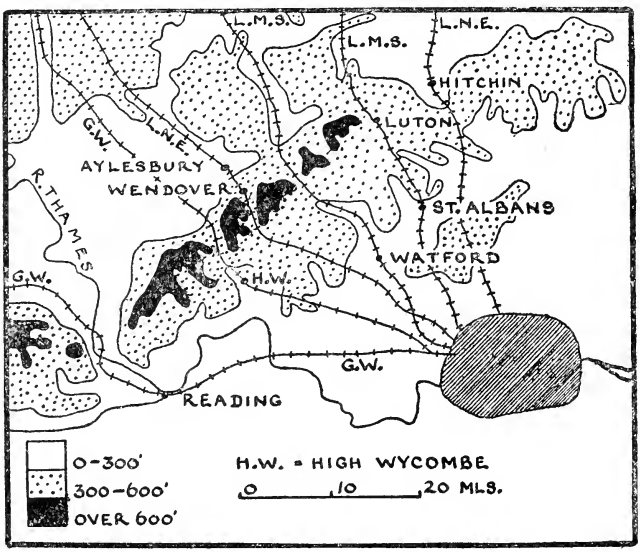


DIAGRAM 60. RAILWAY ROUTES FROM LONDON THROUGH THE CHILTERN HILLS

good example of the way manufacturers may be forced to change with the times. In the days, not long ago, when men wore straw 'boaters' in summer, Luton was the great centre of manufacture and, when fashions altered, the Luton makers used their knowledge of the hat trade to make the hats now wanted. Oxford is not only a university town, but is also the chief home of the gigantic Morris organization. The reason is that Morris, now Lord Nuffield, was the owner of a garage just outside Oxford, and it was natural that, when he started motor car manufacture, his works should be in the neighbourhood.

Question 1. Luton and Oxford have been mentioned as towns where cars are made. Another in this region is Dagenham, on Thames side (shown on diagram 63), the home of Ford cars in England. Other towns have been mentioned in earlier chapters, and it will be realized that although some of the centres are near coal-fields, others are not. Suggest reasons why factories have been started away from the coal-fields. [Think (*a*) of the raw materials other than steel used in making a car, (*b*) how a motor car is taken from one part of the country to another, (*c*) the value of a car compared with the cost of raw material.]

High Wycombe is a great centre for chair-making and for furniture. The existence of local beech forests on the lower slopes of the chalk may account for the origin of the industry. Although the work is now done mainly in factories, there are still men who turn chair legs or make complete chairs in their own cottages. Such men sell their goods to the factories.

Reading is at the junction of the Thames and the Kennet. From Reading north-westwards rail and road pass through the Goring gap, where the Thames breaks through the chalk hills, and from Reading westwards routes go up the Kennet valley to the west country. The town has minor manufactures, including that of biscuits.

Swindon, a great G.W.R. junction, with railway workshops, is a new town, whose very existence is due to the coming of the railways.

Question 2. Give the name of another junction town which came into being because of railways (Chapter VIII).

A word must be said on the colossal problem of supplying the London area with water. The main source of supply is the Thames above Teddington, and some is obtained from

the Lea and from wells. A number of firms in the 'City' supply themselves with water from artesian wells; the fountains in Trafalgar Square are fed from this source. Diagram 59 shows how the water from the Chilterns and the North Downs drains down on the Gault clay, and collects in the porous chalk. A well sunk through the overlying London clay taps this water.

In London and the London area live some ten million people, nearly one-quarter of the population of Great

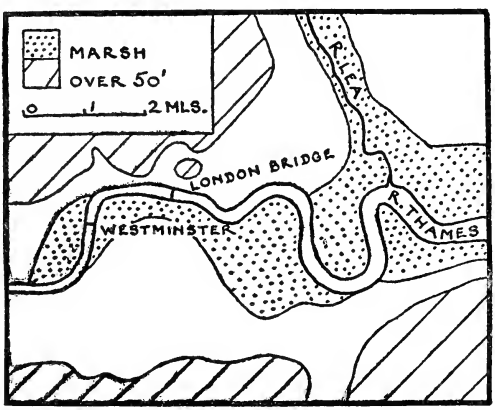


DIAGRAM 61. THE SITE OF LONDON IN ROMAN TIMES

Britain. It is necessary to attempt an explanation of this amazing fact. Diagram 61 shows part of the Thames valley as it was in Roman times. There may have been a small settlement before this, for some advantages of the site were obvious—the firm land above flood level on which to live, and the protection afforded by the marshy ground to the east. It seems probable, however, that any early settlement was only a landing place on the river leading to Verulamium (near the present St. Albans). In fact, the Roman choice of London as their administrative centre may be compared, in some measure, with the British choice in India of Calcutta as their early capital rather than Delhi. The

Romans made London the heart of their great road system, as, in later times, it has also become the centre of both roads and railways. The Thames could be forded at what is now Westminster but, either in Roman times or just later, a bridge was built, and this definitely fixed London as the head of navigation of the river.

Before the discovery of America, English trade was mainly with Europe, and thus it was ports on the east and the south that had the greater trade. The Thames led into the heart of populated England, and London became, because of its central position, not only a great port, but a great market town as well. The Roman capital was London, but the Normans used Westminster, where the Houses of Parliament and many government offices still are, but when London expanded westwards to include Westminster, it again became the capital of the country. The great point to realize is that London was an important town long before Liverpool or Manchester or Glasgow or Birmingham. The trade was such that even in the sixteenth century the wharves just below London Bridge were so crowded that there then began the practice, the anchoring of ships in the river and unloading into barges, which still persists. But even this was found to be insufficient, and in the early nineteenth century began the building of docks lower down the river, easily cut out of the drained marshland. These are shown in diagram 62 and, in some cases, the names are an indication of the times when they were built. There is some specialization; thus the West India and East India Docks still handle considerable quantities of goods from these areas (e.g. sugar at the West India Docks, tea and silk at the East India Docks), the Surrey Commercial Docks deal in timber and dairy produce, while the Royal Albert Dock deals mainly with meat. The P.L.A. (Port of London Authority), which controls the docks and the river, is justly proud of the fact that the Royal Victoria, Royal Albert, and George V Docks form the largest extent of enclosed dock

water in the world. The river has been systematically deepened within recent years, and these docks can accommodate big ships; it was mentioned in Chapter I that the ships come up river at high tide, enter the docks, and that the dock gates are closed behind them. In the Thames the

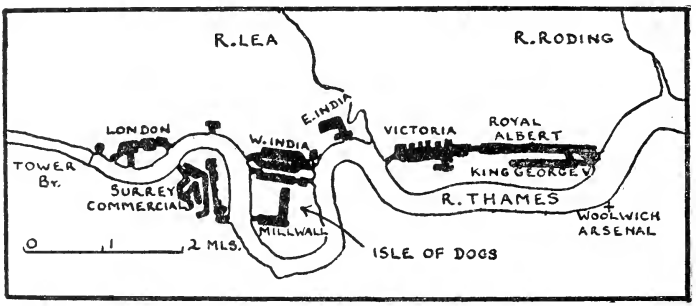


DIAGRAM 62. THE LONDON DOCKS
(excluding Tilbury)

tidal currents provide a good natural scour, although they are not strong enough to hinder navigation. It is, however, at Tilbury that docks are found which can take any ship in the world. Tilbury must be thought of as an outport of London; it handles most of the passenger traffic coming into the port of London, and the L.M.S.R. provides good services not only to London, but to other parts of the country as well.

Question 3. All large towns, for example, London, New York, Berlin, Paris, are manufacturing centres, even although they are not near coal-fields or other sources of cheap power. Why is this? [Consider: (*a*) a manufacturer not only has to make goods, he has to —— them; (*b*) the difference of the response to an advertisement for employees in a local paper in a small town and a large.]

It is not easy in the case of London, as it is in that of, say, Bury, Burton, or Bradford, to state the main industry. The manufactures may be divided into two classes: (*a*) those

Aerofilms

LONDON DOCKS. The Royal Victoria, Royal Albert, and King George V docks, which together form the largest sheet of enclosed dock water in the world (see diagram 62)

which require little power, so that the disadvantage of distance from a coal-field is more than balanced by nearness to a great market and port, and to excellent lines of internal communication; (*b*) those needing bulky goods which can most easily be brought by water.

Question 4. Classify the following, which are some of the industries of London and Thames side (the position of the Thames-side factories is shown in diagram 63):

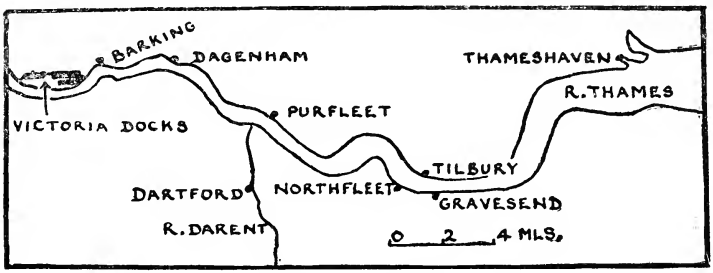


DIAGRAM 63. THE POSITION OF INDUSTRIAL CENTRES ON THAMES SIDE (see Question 4)

ready-made clothing (East End), clocks and watches (Clerkenwell), cement (Purfleet, Northfleet), paper (Purfleet, Gravesend, Dartford), Ford motor works (Dagenham), oil refineries (Thames Haven), sugar factories (Silvertown, near Victoria Docks), flour mills (near Victoria Docks and Surrey Commercial Docks), gas works (in many places, e.g. Dartford, Barking), electric-power stations (in many places near the Thames, e.g. Barking, Battersea; remember that the generation of electricity here is based on coal), furniture (Shoreditch), soap (Bow).

Question 5. London has lost her former shipbuilding industry. Why is this? [She still retains, however, the industry of ship-repairing.]

The 'southward march of industry' is an unfortunate

phrase in common use to-day. It is unfortunate because it suggests an untruth, that the industries of the north are coming south. The cotton manufacturers of Lancashire are not rebuilding their factories in London, nor are the steel makers of Sheffield. What is true, however, is that new factories are being set up in the London area. These are principally for goods expensive in proportion to their size, and requiring little power. A journey, for example, along the Great West Road out of London, will show these new clean factories with a wide range of products from cosmetics to wireless sets.

London is, in addition, a great market. There are not only the great food markets like Billingsgate (fish), Smithfield (meat), or Covent Garden (fruit and vegetables), which buy and sell for south-eastern England, but also markets, for example, in tea, for the whole country. In addition, London is also a market for nearby parts of Europe. London imports goods which are later exported to Europe; this is called entrepôt trade. This is partly because of the importance of London as a great market for goods in Britain, and also because the British own about one-third of the merchant navy of the world. In the past this fraction was even greater, and it was natural that British traders should send goods from abroad to the mother country. London handles about 60 per cent of the entrepôt trade of Great Britain. Rubber, furs, hides, and skins are examples of this trade. In the case of wool a more precise explanation is possible. London was, in the Middle Ages, a great exporting port for wool, and hence became a great wool market. The nature of the trade has changed, but London has kept her status as a wool market, for, although some high-quality English wool is still exported, the trade to-day is almost entirely in imports. It has been stated earlier, in Chapter VIII, that Hull gets much of her wool, not as a direct import, but by coasting steamer from London. This is true not only of Hull, but of the adjacent parts of Europe as well.

Question 6. There is an example in Chapter VI of this trade, a metal which comes first to London and then goes to South Wales. What is it?

The import trade of London may thus be summed up as food, for example, meat, grain, sugar, butter, tea; and raw materials, either for the industries mentioned or because London is a great market, for example, wool, hides and skins, timber, petroleum, tobacco, furs. The exports are much lower in value, and include machinery and motor cars.

It is often possible, although not with strict accuracy, to state that a town falls into a particular category. Bury is a great industrial town, York is not, but it is the administrative centre of Yorkshire, a market town, a shopping and amusement centre, and an ecclesiastical city. Other towns are important commercially, for example, Manchester, which is where the buying and selling of cotton is done. Hull is a port. London exercises all these functions. Theatreland and the big shops are in the West End, the great government offices are in Whitehall, the commercial area is still the 'City,' although commerce is invading the West End, and the East End is mainly industrial.

Question 7. The houses of the wealthier people are in the *west* end of London, Paris, and Berlin. Why is this? [Think of the direction of the prevalent winds.]

Question 8. Should London be allowed to grow any bigger? [It is said that Elizabeth was worried over the growth of London, which had then about 160,000 people. Cobbett (1762–1835), author of the *Rural Rides*, called London 'the great wen' (wen=tumour). The initiation of the 'Green Belt,' that is, the purchase of land on the outskirts of London on which building is prohibited, should be remembered. Lastly, it is well to realize that there are over a quarter of a million transport workers in London.]

Examination Questions

1. What geographical factors helped to decide the exact position of London on the Thames? What advantages has London as (*a*) an industrial city, (*b*) a seaport? (Cambridge.)

2. Account for the importance of London as (*a*) capital city, (*b*) port, (*c*) manufacturing centre. (Cambridge.)

3. What geographical reasons help to explain the size and importance of London? Give the approximate number of people in London. (Oxford.)

4. Draw a map to illustrate the distribution of the industries of *one* of the following: (*a*) the Central Lowlands of Scotland, (*b*) Northern Ireland, (*c*) the London region. Give an account of the industries in the region selected. (C.W.B.)

5. Describe the general relief, the climate, the resources, and the chief agricultural and manufacturing industries of either the Thames basin or the Clyde basin. (London.)

CHAPTER XVII

COMMUNICATIONS

THERE have been two periods in Britain when roads have been good, in the time of the Romans and in the last hundred and fifty years. It is not that Britain was any different from the rest of Europe in this, for all over Europe in the Middle Ages travellers were regarded as deserving recipients of Christian charity.

As long as subsistence farming and cottage industries lasted, good communication was not so vital as it is nowadays. It is reported that George II spent a whole night covering the seven miles between Kew and St. James's Palace and, although the fact that this has been remembered suggests that it was unusual, all journeys were painfully slow even in the late eighteenth century. From Edinburgh to London took between ten and twelve days, and from London to Exeter four. Goods were usually carried by packhorse, each horse carrying about $2\frac{1}{2}$ cwt. in panniers, and rates were high, for example, from Derby to London the charge was from 6*s*. to 7*s*. 6*d*. per cwt. Laws were even passed fixing the minimum width of wheels because narrow ones made deeper ruts, that is, the attempt was made to fit the traffic to the roads rather than the roads to the traffic. It is obvious that river and coastwise traffic were important, and Britain was fortunate in the large number of her streams. The Industrial Revolution, which meant the greater use of coal and the need to move raw materials to the coal-fields, stimulated the use of rivers and of canals, which were built towards the end of the eighteenth century. There was a canal 'boom,' although canals enjoyed but a brief reign, for before many of them were completed the railway engine was invented. It is even said that some canal beds, which had

never had water in them, were bought by railway companies and used for the permanent way. Road, rail, and canal form then the main arteries of traffic.

Question 1. Why are nearly all British towns on rivers?

Question 2. Air transport is not important in Britain as it is on the Continent or in the U.S.A. Why is this? [Consider (*a*) distances to be covered, (*b*) where a business man working in the 'City' would have to go to get in an aeroplane.]

Britain is fortunate in that hard stone for road-making and for the construction of the permanent way of railways is widespread. From the beginning of the nineteenth century, when Telford showed the importance of a solid foundation and good drainage, and Macadam realized that stone broken into pieces of about the same size would bind together, the road system of the country has steadily improved. There was a short coaching era, and most people know what a journey in a coach was like from the description of Tom Brown's ride to Rugby. The railways, however, which, to begin with, only carried goods, soon began to carry passengers, and road traffic declined until the coming of the motor car. Inns on main roads, which have enjoyed little prosperity since the coaching days, have now found themselves again in demand. Macadamized roads have been improved by laying tar over the surface to stop dust, hence the name 'tarmac.' To-day the roads carry about one-third of the goods traffic and a higher proportion of the passenger traffic of the country. These proportions are likely to increase, for it is possible by road to go 'from door to door,' and many companies have found it worth while to run their own fleets of lorries. In the building of the railways Britain was fortunate, for there are few upland areas which cannot be avoided by a slight detour or through which river valleys or gaps cannot be found.

Question 3. Give examples of lines avoiding hilly districts and others showing the use of river valleys.

Canal transport to-day is small compared with road or rail. Rivers in the British Isles are small, canals must be small, and the 50- or 100-ton barge on an English canal must be contrasted with the 1,000- to 4,000-ton barge on the Rhine. Again, although south-eastern England is a plain, it is not dead level, and the canals usually have an average of about one lock per mile. Their value must not, however, be ignored, for they do carry bulky goods, coal and china clay for example, and in some areas, in the Midlands and round Hull, water traffic is considerable (see diagram 43). Although it is true that British rivers are not of great use for transport, it should hardly be necessary to stress the enormous importance of many of their estuaries.

The first public railway was between Stockton and Darlington (1825), and was built to carry coal. Within a few years similar short stretches were constructed in other coalfields, in central Scotland, South Wales, and elsewhere. Then it was realized that passenger carrying could be a profitable business, and lines were built joining all large towns. There was much opposition to the new invention. Farmers claimed that the smoke would ruin their fields and injure their animals, and if, in some towns, it is found that the railway station is far from the centre of the town, the reason is usually the shortsightedness of the inhabitants who refused to allow a railway company to approach any nearer. The following extract of a letter sent by the Vice-Chancellor of Cambridge University to the Eastern Counties Railway, when it proposed to run trains to Cambridge on Sundays, shows the general attitude. 'The Vice-Chancellor of the University of Cambridge wishes to point out to the directors of the Eastern Counties Railway that such a proceeding would be as displeasing to Almighty God as it is to the Vice-Chancellor of the University of Cambridge.'

It must be realized that there is often a difference between railway construction in a new country and in an old. In a new country, for example, Canada, it often happens that a district is not settled until a railway has been built, that is, a railway is pushed into virgin country: it is not until communications are assured that farmers are prepared to take up land. Although there are some exceptions, it is broadly true to say that, in an old country, railways have duplicated existing routes, that is, they have not opened up new areas or created new towns.

Question 4. (i) Exceptions to this statement are 'junction' towns. Give two examples. (Chapters VIII and XVI.)

(ii) Southampton is an example of a port where an excellent railway service is essential. Explain.

The great fishing ports, too, would not be as important as they are without railways, for a fast service is necessary to carry the perishable fish to the markets. Two newer fishing ports, Fleetwood and Milford, have been created by the railways, for the L.M.S.R. and the G.W.R. laid themselves out to induce fishing boats to use these harbours.

The railway systems of Great Britain are now four in number (diagram 64): G.W.R. (Great Western Railway), L.M.S.R. (London Midland and Scottish Railway), L.N.E.R. (London and North-Eastern Railway), and S.R. (Southern Railway).

Great Western Railway. There are really three main lines going north-west, west, and south-west from London, although they all start from one terminus, Paddington.

Question 5. Write out a list of the chief towns on the three main lines: north-west from Paddington to Birkenhead; west from Paddington to Fishguard; south-west from Paddington to Penzance.

London Midland and Scottish Railway. There are two main lines: (*a*) the former London and North-Western Railway,

which starts from London (Euston) and goes north-west, that is, west of the Pennines to Carlisle and then to Glasgow, Inverness, and Wick; (*b*) the former Midland Railway,

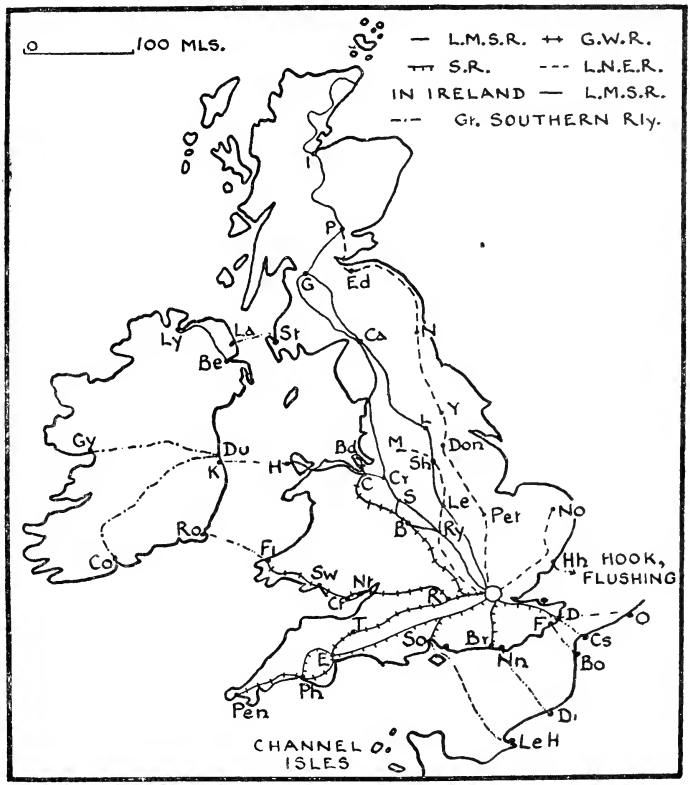


Diagram 64. The Main Railways

which starts from London (St. Pancras), and serves the Midlands. Note that this route goes through the Aire gap on its way to Carlisle.

Question 6. Write out a list of the towns on these two main lines.

London and North-Eastern Railway. This is not a good name

for this railway system, and it is easier to consider it as (*a*) the former Great Northern Railway, which starts at London (King's Cross), and goes north, that is, east of the Pennines to Newcastle, Edinburgh, Perth; (*b*) the former Great Eastern Railway, which starts at London (Liverpool Street), and serves Essex and East Anglia; (*c*) the former Great Central Railway, which starts at London (Marylebone), and serves central England.

Question 7. Write out a list of the towns on these three main lines.

The Southern Railway. This is a good name for this railway system, for it serves south England from Kent to parts of Cornwall. The main lines in the south-east are, naturally, short, for example, London (Victoria) to Dover or London (Victoria) to Brighton. The only long route is that of the main line of the old London and South-Western Railway from London (Waterloo) to Exeter and Plymouth.

Examination Questions

1. Draw a sketch-map to show the route of a railway from London to Crewe. Indicate on it the chief features of the relief related to the route, and two large towns on the route. (London.)

2. Draw sketch-maps to show the quickest railway or combined railway and steamship route for three of the following journeys: (*a*) London to Dublin, (*b*) Newcastle to Belfast, (*c*) Carlisle to Glasgow, (*d*) Newcastle to Edinburgh. (Oxford.)

CHAPTER XVIII

POPULATION: THE COUNTIES

Question 1. The population in England and Wales was about 5,000,000 during the fourteenth, fifteenth, sixteenth, and seventeenth centuries (of course, it varied; for example, the effect of the Black Death was to reduce the population from just over 4,000,000 to just over 2,000,000). In 1700 it was 5,500,000, in 1800, 9,000,000, while it was 40,000,000 at the last census. What happened in the late eighteenth century and during the nineteenth to explain the increase? (Chapter III.) [Two points must be mentioned. There was emigration on a considerable scale from England during this period, so that the increase was in spite of a loss, mainly to parts of the British Empire. Emigration from Scotland and Ireland has been discussed but not that from England, which occurred at various times and from varying causes. Anything which served to put men out of work stimulated emigration, for example, the introduction of machinery, both on farm and in factory, the drop in the price of wheat after the Napoleonic Wars, and the competition of cheap wheat from abroad after 1870. Secondly, this enormous increase, which has been an increase in *town* population, could never have occurred had there not been improvements in medicine and sanitation. For example, Jenner announced his discovery of vaccination to the world in 1798 and, although this is a somewhat controversial subject, the fact remains that a pock-marked face is now rare, but was a common sight up to the early nineteenth century. Before these advances in medical knowledge, towns had been considered as the graves of population

and, until recently, it was unusual for townsmen to be able to trace their ancestry back to other townsfolk. The point of the question, however, is one that some

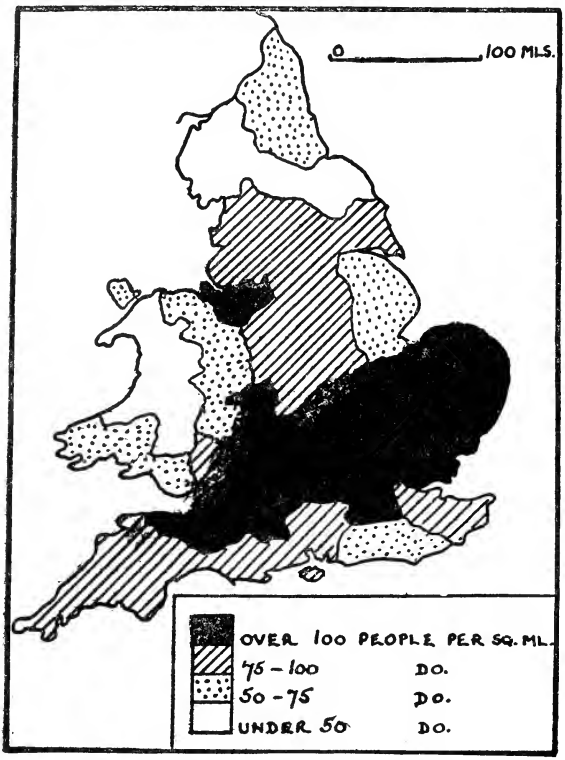


DIAGRAM 65. THE DENSITY OF POPULATION IN ENGLAND AND WALES PRIOR TO THE INDUSTRIAL REVOLUTION (about 1700)

people find easy to grasp, others very difficult, that the number of people in a country is dependent on its natural resources. It is no accident that the Amazon basin or the Arctic is thinly peopled or, to come nearer home, that Finland has fewer than 4,000,000 people in an area greater than the whole of the British Isles.]

DIAGRAM 66. THE DENSITY OF POPULATION TO-DAY

Question 2. Diagram 65 shows the density of population in 1700 and diagram 66 that at the present day. (i) What differences are there? (ii) Why have these changes occurred. [Note that similar shadings in the two maps have different meanings.]

Diagram 66 is a simplified map: atlases often contain maps which are much more detailed. The map, however,

attempts by its threefold division to emphasize what has been mentioned before, viz. the dense population of the industrial areas, the scanty population of the uplands, and the moderate density of the good farming districts. England alone is divided by some people into two by the Jurassic escarpments; to the south and east lies metropolitan England, while to the north and west are the great coal-fields, and hence industrial England.

The Counties.

The beginning of the division of England into counties goes back to the time of the Saxons. In the east and south-east it has already been said that the present counties correspond roughly with the old Saxon kingdoms, for example, Kent, Surrey, Middlesex, Sussex, Essex, Norfolk, Suffolk. These early kingdoms were geographical units cut off from their neighbours by some natural barrier, hills, a river, or thinly peopled, difficult country.

Question 3. What were the natural boundaries of (*a*) East Anglia (Chapter XI), (*b*) Sussex, Surrey, and Kent (Chapter XII)?

Question 4. For which counties does the Thames act as a boundary?

The later counties seem to have been made by choosing an important town, and making it the centre of government of the surrounding district, and counties so formed nearly always take the name of their county town. Thus in the Midlands of England the counties are usually part of a river basin or sometimes all of it, for the towns chosen were, like nearly all British towns, on rivers. These counties are often not separated from one another by any well-defined natural feature.

Question 5. What river basins or parts of river basins

are found in the counties of Shropshire, Hereford, Gloucester, Worcester, Warwick, Northampton, Leicester?

In the north of England the county towns are naturally on the plains which flank the Pennine Upland and, as in south-eastern England, there was at first no boundary line between, say, Cumberland and Northumberland. The counties were separated from one another by thinly peopled upland; a precise boundary came later.

Question 6. In the Highlands of Scotland the county towns are on the east coast with one exception, Inveraray (Argyllshire).

(i) Why are the county towns on the east coast?

(ii) What can be noticed about the east and west extent of the counties of Sutherland, Ross and Cromarty, and Inverness?

Examination Questions

1. Describe and account for the differences in (*a*) occupations, (*b*) distribution and density of population in England and Wales between the area north and west of a line joining the estuaries of the Humber and Severn and that to the south and east of it. (Cambridge.)

2. Explain why (*a*) two hundred years ago most people in England lived in the south and east; (*b*) now most people live in the north; and (*c*) at present the population of the south is increasing more rapidly than that of the north. (Oxford.)

3. Describe and explain the distribution of population either in Scotland or Ireland. (Bristol.)

4. Suggest geographical reasons why the population of Lancashire is greater than that of the whole of Ireland. In

what parts and *why* is the population (*a*) of Lancashire *sparse*, (*b*) of Ireland relatively *dense*. (Cambridge.)

5. The following figures give density of population per square mile. Suggest reasons for the density in each area.

Highlands of Scotland . .	less than	50
East Anglia	,,	250
Glamorganshire . . .	over	500

(Oxford.)

6. Describe and try to account for the distribution of population in England north of the latitude of Derby *or* in the Central Lowlands of Scotland. (London.)

7. What factors influence the distribution of population in either Wales or Ireland? (Bristol.)

Imports	*per cent*		*Exports*	*per cent*
Food, drink, and tobacco:			*Food, drink, and tobacco:*	
Meat	10			
Dairy produce	9			
Grain	8			
Fruit and vegetables	4			
Tobacco, animal feeding stuffs, etc.	—			
Total		47	Total	8
Raw materials:			*Raw materials:*	
Wool	5		Coal	9
Wood	5			
Raw cotton	4			
Oil-seeds	3			
Hides and skins, paper-making materials, iron and other ores, rubber, etc.	—			
Total		27	Total	12
Manufactures:			*Manufactures:*	
Petroleum	5		Cottons	11
Non-ferrous metals	4		Machinery	11
Machinery, iron and steel, paper, chemicals, etc.			Vehicles	10
			Iron and steel manufactures	9
			Woollens	6
			Chemicals	5
Total		26	Total	80
Grand total		100	Grand total	100

The trade figures are of Great Britain and Northern Ireland, for Eire now ranks as a separate unit; its trade has been discussed in Chapter VII, and need not be described here. The exports given are those classified by the Board of Trade as domestic, for the re-export of produce from other countries, the entrepôt trade, is excluded. Its value is considerable, usually some 10–14 per cent of the value of domestic exports. The presentation of the figures as percentages has many advantages, but also one serious disadvantage, for it does not show that the value of the imports is about twice that of the exports. If it were possible, the exports of any country should show not only the goods which are sent to other countries, but also the services rendered to them. British people own about one-third of the mercantile marine of the world, and if a British ship carries goods for a foreigner this is really an export just as much as sending him a bale of cotton goods. Similarly, British bankers and insurance brokers do business outside this country. These services are often classed as 'invisible' exports, because their value does not appear in ordinary trade figures. In the past, too, British people have invested money abroad in railways, mines, docks, factories, and plantations, and the interest on this money is an import with no corresponding figure in the exports.

Question 1. Show the trade figures in diagrammatic form: if space permits make the import diagram twice the size of the export.

The percentages given are of value; if weight were given one significant point would be shown, the great importance of the export of coal, which is about one-half the total weight of the exports. The proportion has been even higher than this, but the export of coal has declined in recent years. The coal trade has obviously been a major factor in stimulating shipbuilding, and has also enabled colliers to quote low rates for a suitable return cargo, for example, iron ore.

Question 2. (i) Why is iron ore a suitable return cargo? (ii) Why has the export of coal declined? (Chapter VI.)

The broad idea of the trade of Great Britain and Northern Ireland is simple to grasp. This country is mainly a manufacturing one with 90 per cent of its people living in towns. The exports are therefore mainly manufactured goods, and it is necessary to import food for the industrial population and raw material for the factories. It may seem strange to find even a small percentage under food, drink, and tobacco in the exports, but this is principally processed food, or pipe tobacco and cigarettes, that is, products which could be classed as manufactures. The main items in the long list of manufactured goods exported are given, but the classification could be given in another way: textiles and iron and steel goods make up over 70 per cent of the manufactures. The importance of overseas markets to the textile industries may be judged by the fact that about three-quarters of the cotton goods and about one-half of the woollen goods made in this country are exported. The term vehicles in the list of manufactures exported is used by the Board of Trade to include ships.

Both the food and the raw materials imported include some, for example, wheat, meat, iron ore, wool, which are produced at home, but in insufficient quantities, and others, for example, coffee, bananas, cotton, which are not grown in this country at all.

Question 3. Iron and steel imported, for example, into Sheffield, is classified under manufactures. What objection is there to this classification? [What will be done in Sheffield with it?]

Although there are other imports classed as manufactures which could be otherwise considered, because they form the raw material of industry, it is none the less true that Britain,

despite her great export trade of manufactured articles, imports many as well. An observer on a street corner of a busy town will be passed, in the course of a few minutes, by foreign motor cars worth many thousands of pounds. British motor cars are good, but some people prefer foreign cars.

Question 4. Many 'one-price' stores often have foreign manufactured goods on sale. Of what type are these?

The nature of Britain's trade has been discussed; it remains therefore to describe the countries with which the trade is carried on. It can be shortly expressed in two words, it is world wide, for there is hardly a country in the world from which Britain does not draw some commodity, or to which she does not send either her manufactures or her coal. The dependence of British people on their foreign trade may be made clearer by thinking of the life of one man for the first hour or two of any day. He is awakened by an alarm clock which, if a cheap one, is probably of foreign manufacture. He rises from his bed, most likely made of foreign timber, and throws off the sheets and blankets. The sheets, if cotton, are of foreign material and the blankets almost certainly contain Australian wool, for four-fifths of the wool used in Great Britain is imported. The soap in the bath is made of foreign oils, palm and ground-nut oils from West Africa, or whale oil from Antarctica. He sits down to breakfast and eats bread made largely from foreign flour, bacon, which may be home-produced, but is more likely from Denmark, butter from New Zealand, Denmark, or Australia, marmalade from Spanish oranges, and perhaps ends his meal with an apple from Canada, U.S.A., Australia, or New Zealand. The milk in his tea or coffee is home-produced, but the tea originated in India, Ceylon, or Java, or the coffee in East Africa, Arabia, central America, India, or Java. And so the story could go on.

The table below gives the broad facts of this world-wide trade:

Countries from which imports come or to which exports are sent	*Imports [in percentages]*	*Exports [in percentages]*
British Empire . .	40	50
Europe . . .	30	30
U.S.A. . . .	12	5
Central and S. America .	10	7
Others . . .	8	8
	100	100

The figures bring out clearly the fact that, important though inter-imperial trade is, more than one-half of the total trade of Great Britain and Northern Ireland is carried on outside the empire.

The Important Ports.

	Export	*Import*	*Total*
	Percentages of Total Exports	*Percentages of Total Imports*	*Percentages of Total Trade*
London . .	26	43	38
Liverpool . .	29	19	22
Hull . .	6	6	6
Manchester .	4	5	4
Southampton .	6	4	4
Glasgow . .	6	3	4

The main ports serving the great industrial areas have been shown and discussed, but there has been little comparison between the different ports. The figures show the amazing fact that 60 per cent of the total trade of Great Britain and Northern Ireland is carried out by two ports,

London and Liverpool, and that nearly 80 per cent is done by the first six. (It may be noted here that London also has the greatest coastal trade, principally in coal, of any British port.)

Question 5. (i) The values of the exports and imports into Liverpool are approximately the same, whereas the imports of London are far greater than the exports. Suggest reasons for this.

(ii) Why is Liverpool a more important port than Bristol. [Bristol does about 2 per cent of the total trade of Great Britain and Northern Ireland.]

(iii) Why are the imports of Harwich much greater than the exports? [Remember that Harwich is really an outport of London, with trade mainly with Denmark and the Netherlands.]

It may be convenient to add here a brief summary of the trade of the main British ports.

London.

Imports: food; raw material for Thames-side and London industries, or because it is a great market (e.g. wool, hides, and skins, petroleum).

Exports: manufactured goods (machinery, cars).

Re-export: wool, furs.

Liverpool.

Imports: food; raw materials (raw cotton, raw wool).

Exports: manufactured goods (cottons, woollens, machinery, chemicals).

Hull.

Imports: food; raw materials (wool, iron ore, timber).

Exports: manufactures (cottons, woollens, machinery).

Manchester.

Imports: food; raw materials (raw cotton).

Exports: manufactures (cottons).

Southampton.

Imports: food.

Exports are small in value.

This is the premier passenger port.

Glasgow.

Imports: food; raw materials.

Exports: manufactures (iron and steel goods, cottons).

Examination Question

Describe (*a*) the position and (*b*) the trade of three of the following: Liverpool, Hull, Bristol, Glasgow. (C.W.B.)

CHAPTER XX

CONCLUSION

This book has described the Britain of to-day with its differences of scenery, climate, natural resources, and the varying ways in which the people earn their daily bread. But Great Britain and Northern Ireland, as well as being the home of some 45,000,000 people, are also the mother country of the largest empire the world has ever seen, with about one-quarter of the people and one-quarter of the land area of the world. It is not easy in a few sentences to explain how this has occurred. It is natural for an island people to be fishermen, boat-builders, and sailors and, after the fifteenth and sixteenth centuries, when the routes to America and the Far East had been discovered, it was the enterprising English merchant in search of markets who took English ships to all parts of the globe. It was in order to facilitate this trade that many parts of the world came under the British flag. The early colonies were usually island stepping-stones necessary as refitting stations on long sea routes or coastal strips, for example, the St. Lawrence lowlands and the coasts of West Africa and India, from which goods could be sent to or obtained from the interior. The England of the days before the Industrial Revolution exported not only woollen goods, ploughshares, knives, and boots, but even food, wheat, cheese, butter, and salt. In fact, the capital necessary to build the factories and buy the machinery during the Industrial Revolution was provided mainly by merchants who had amassed their wealth in colonial trade. The idea has been summarized in the statement that Britain's territorial empire is a by-product of her 'trading empire.'

Emigration from Great Britain and Ireland during the last

century was largely to parts of the empire, and resulted in a double division of it into colonies of settlement, Canada, South Africa, Australia, New Zealand, and colonies of 'capital.' By the latter was meant areas in which white settlement was impossible, but where British people had large interests in trade, mines, or plantations. But the old idea of empire where the possessions were considered solely from the point of view of their ability to increase the wealth of the home country has been superseded; the colonies of settlement have become self-governing dominions and, in the others, the interests of the governed are now given far more weight. The root cause of the loss to Britain of the American colonies was the determination of the colonists not to be exploited for the benefit of England. The self-governing dominions are, for all practical purposes, independent communities, and could break away entirely if they so desired. Thus the British Empire of to-day is different from any of its predecessors in the loose, almost invisible, links which bind the dominions to Britain, and the hope has been expressed that in time all parts of the empire will have dominion status. In fact, the term empire, which has always meant a great power ruling over a number of subordinate states, is gradually being ousted by the word commonwealth, which better expresses the free and equal partnership which exists between Great Britain and Northern Ireland and the self-governing dominions. This chapter may fittingly conclude with the words of a former enemy, Field Marshal Smuts: 'The old British Empire died at the end of the nineteenth century. To-day it is the widest system of organized freedom which has ever existed in human history.'

Examination Questions

1. Show by means of a sketch-map the position and extent of *one* important iron and steel manufacturing area in England and Wales. Describe the industry in that area,

and state the chief sources of supply of the raw materials used. (Cambridge.)

2. Give reasons for three of the following:

(*a*) Why the climate of Cornwall is less extreme than that of East Anglia.

(*b*) The location of the woollen textile industry in the Tweed basin.

(*c*) The absence of large seaports in western Ireland.

(*d*) The location of the linen textile industry in Northern Ireland. (Cambridge.)

3. Account for the facts in three of the following:

(*a*) There is a smaller proportion of arable land in Ireland than in England.

(*b*) Crewe is an important railway centre.

(*c*) A century ago Britain produced almost enough wheat to support her population; now much wheat is imported.

(*d*) Glamorgan is the most densely populated county in Wales. (Cambridge.)

4. Illustrating your answer with sketch-maps, show how geographical factors have influenced the growth and importance of three of the following towns: Belfast, Birmingham, Bristol, Dundee, Norwich. (Cambridge.)

5. Select any two of the following areas and describe and account for the industries carried on in each: Lanarkshire, Tweed valley, Greater London. (Cambridge.)

6. Describe the position of three centres in the British Isles important for shipbuilding. What advantages for the industry has each of these centres? (Cambridge.)

7. Give briefly reasons for three of the following:

(*a*) The west coast of England is higher and more rocky than the east coast.

(*b*) The inlets (rias) of south-western England or of south-western Ireland are good harbours, but have no large ports on them.

(*c*) East Anglia has a more extreme climate than Cornwall.

(*d*) Northern Ireland is an important centre of the linen industry. (Oxford.)

8. Choose (*a*) an Irish port, (*b*) an English agricultural market town, and (*c*) a Welsh manufacturing town, and describe, with the help of sketch-maps, the geographical factors which have contributed to the growth of each. (Oxford.)

9. Clydebank, Tyneside, and Belfast are three important centres of shipbuilding in the British Isles. Show, by sketch-maps only, the geographical factors which have helped the development of this industry in each of the three centres, (N.U.J.B.)

10. Illustrate two of the following statements by means of sketch-maps:

(*a*) The more important Irish ports are conveniently situated for trade with Great Britain.

(*b*) Perth and Stirling grew up as gap towns situated at bridge heads.

(*c*) The main railway lines leave the London basin by gaps in the chalk hills. (N.U.J.B.)

11. Give briefly the distribution of the main coal-fields in England and Wales. Discuss one of them in more detail, indicating its position and extent, its principal industries, and its chief towns. (Bristol.)

12. Select three of the following towns, and in each case suggest reasons for its growth and importance: Aberdeen, Reading, Perth, Manchester, Carlisle. (London.)

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